Mathematics

Statistics

Letter to Families from the DPSCD Office of Mathematics

Dear DPSCD Families,

The Office of Mathematics is partnering with families to support Distance Learning while students are home. We empower you to utilize the resources provided to foster a deeper understanding of grade-level mathematics.

In this packet, you will find links to videos, links to online practice, and pencil-and-paper practice problems. The Table of Contents shows day-by-day lessons from April 14th to June 19th. We encourage you to take every advantage of the material in this packet.

Daily lesson guidance can be found in the table of contents below. Each day has been designed to provide you access to materials from Khan Academy and the academic packet. Each lesson has this structure:

Watch: Khan Academy (if internet access is available)	**Practice: Khan Academy (if internet access is available)**	**Pencil & Paper Practice: Academic Packet**
Watch and take notes on the lesson video on Khan Academy	Complete the practice exercises on Khan Academy	Complete the pencil and paper practice.

If one-on-one, live support is required, please feel free to call the **Homework Hotline** at **1-833-466-3978**. Please check the Homework Hotline page for operating hours. We have DPSCD mathematics teachers standing by and are ready to assist.

We appreciate your continued dedication, support and partnership with Detroit Public Schools Community District and with your assistance we can press forward with our priority: Outstanding Achievement. Be safe. Be well!

Deputy Executive Director of K-12 Mathematics

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Important Links and Information

Clever

Students access Clever by visiting www.clever.com/in/dpscd.

What are my username and password for Clever?
Students access Clever using their DPSCD login credentials. Usernames and passwords follow this structure:

Username: studentID@thedps.org
Ex. If Aretha Franklin is a DPSCD student with a student ID of 018765 her username would be 018765@thedps.org.

Password:
First letter of first name in upper case
First letter of last name in lower case
2-digit month of birth
2-digit year of birth
01 (male) or 02 (female)
For example: If Aretha Franklin's birthday is March 25, 1998, her password and password would be Af039802.

Accessing Khan Academy

To access Khan Academy, visit www.clever.com/in/dpscd. Once logged into Clever, select the Khan Academy button:

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Accessing Your CPM eBook

Students can access their CPM eBook in two ways:

Option 1: Access the eBook through Clever

1. Visit www.clever.com/in/dpscd. Login using your DPSCD credentials above.
2. Click on the CPM icon:

Option 2: Visit http://open-ebooks.cpm.org/

1. Visit the website listed above.
2. Click "I agree"
3. Select the CPM Statistics eBook:

Statistics

Desmos Online Graphing Calculator

Access to a free online graphing and scientific calculator can be found at https://www.desmos.com/calculator.

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Table of Contents

In the following table, you will find the table of contents and schedule for the week of April 13, 2020 through the week of June 15, 2020.

Week	Date	Topic	Watch (10 minutes)	Online Practice (10 minutes)	Pencil & Paper Practice (25 minutes
Week of 4/14 – 4/17	Monday, 4/13/20	Holiday	N/A	N/A	N/A
	Day 1	5.1.1 Relative Frequency Histograms and Random Variables	Relative Frequency Histograms and Density Curves	Properties of Density Curves	Multiple Choice 1-10 and Free Response 1 - 3
	Day 2	5.1.2 Introduction to Density Functions	Intro to Density Functions	Properties of Density Curves	
	Day 3	5.1.3 The Normal Probability Density Function	The Normal Probability Density Function	The Normal Probability Density Function	
	Day 4	5.2.1 The Inverse Normal Function	The Inverse Normal Function	The Inverse Normal Function	
Week 2	Day 1	5.2.2 The Standard Normal Distribution and Z-Scores	The Standard Normal Distribution and z-Scores	The Standard Normal Distribution and z-Scores	

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	Day 2	5.2.3 Additional Practice Problems	The Standard Normal Distribution and z-Scores	The Standard Normal Distribution and z-Scores	
	Day 3	Chapter 5 Closure	Khan Academy Practice Test	Khan Academy Practice Test	
	Day 4	6.1.1 Mean and Variance of a Discrete Random Variable	Mean and Variance of a Discrete Random Variable	Mean and Variance of a Discrete Random Variable	Multiple Choice 1-10 and Free Response 1 - 3
	Day 5	6.1.2 Linear Combinations of Independent Random Variables	Transforming Random Variables	Transforming Random Variables	
Week 3	Day 1	6.1.3 Exploring the Variability of $X - X$	Exploring the Variability of $X-X$	Exploring the Variability of $X-X$	
	Day 2	6.2.1 Introducing the Binomial Setting	Introducing the Binomial Setting	Introducing the Binomial Setting	
	Day 3	6.2.2 Binomial Probability Density Function	Binomial Probability Density Function	Binomial Probability Density Function	

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	Day 4	6.2.3 Exploring Binomial pdf and cdf	Exploring Binomial pdf and cdf 	Exploring Binomial pdf and cdf 	
	Day 5	6.2.4 Shape, Center, and Spread of the Binomial Distribution	Shape, Center, and Spread of the Binomial Distribution 	Shape, Center, and Spread of the Binomial Distribution 	
Week 4	Day 1	6.2.5 Normal Approximation to the Binomial Distribution	Normal Approximation to the Binomial Distribution 	Normal Approximation to the Binomial Distribution 	
	Day 2	6.3.1 Introduction to the Geometric Distribution	Introduction to the Geometric Distribution 	Introduction to the Geometric Distribution 	
	Day 3	6.3.2 Binomial and Geometric Practice	Binomial and Geometric Practice 	Binomial and Geometric Practice 	
	Day 4	Chapter 6 Closure	Khan Academy Practice Test 	Khan Academy Practice Test 	
	Day 5	7.1.1 Introduction to Sampling Distributions	Introduction to Sampling Distributions 	Introduction to Sampling Distributions 	Multiple Choice #1-10 and Free Response #1-2

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Week 5	Day 1	7.1.2 Simulating Sampling Distributions of Sample Proportions	Simulating Sampling Distributions of Sample Proportions	Simulating Sampling Distributions of Sample Proportions	
	Day 2	7.1.3 Formulas for the Sampling Distributions of Sample Proportions	Formulas for the Sampling Distributions of Sample Proportions	Formulas for the Sampling Distributions of Sample Proportions	
	Day 3	7.2.1 Confidence Interval for a Population Proportion	Confidence Interval for a Population Proportion	Confidence Interval for a Population Proportion	
	Day 4	7.2.2 Confidence Levels for Confidence Intervals	Confidence Levels for Confidence Intervals	Confidence Levels for Confidence Intervals	
	Day 5	7.2.3 Changing the Margin of Error in Confidence Intervals	Changing the Margin of Error in Confidence Intervals	Changing the Margin of Error in Confidence Intervals	
Week 6	Day 1	7.2.4 Evaluating Claims with Confidence Intervals	Evaluating Claims with Confidence Intervals	Evaluating Claims with Confidence Intervals	

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	Day 2	Chapter 7 Closure	Khan Academy Sampling Distributions Practice Test  Khan Academy Confidence Intervals Practice Test 	Khan Academy Sampling Distributions Practice Test  Khan Academy Confidence Intervals Practice Test 	
	Day 3	8.1.1 Introduction to Hypothesis Testing	Introduction to Hypothesis Testing 	Introduction to Hypothesis Testing 	Multiple Choice #1-10 and Free Response #1-3
	Day 4	8.1.2 Hypothesis Tests for Proportions	Hypothesis Tests for Proportions 	Hypothesis Tests for Proportions 	
	Day 5	8.1.3 Alternative Hypotheses and Two-Tailed Tests	Alternative Hypotheses and Two-Tailed Tests 	Alternative Hypotheses and Two-Tailed Tests 	
Week 7	Monday, 5/25/20	Holiday			
	Day 1	8.2.2 Power of a Test	Power of a Test  Types of Errors in Hypothesis Testing 	Power of a Test  Types of Errors in Hypothesis Testing 	

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	Day 2	8.3.1 The Difference Between Two Proportions	The Difference Between Two Proportions	The Difference Between Two Proportions	
	Day 3	8.3.2 Two-Sample Proportion Hypothesis Tests	Two-Sample Proportion Hypothesis Tests	Two-Sample Proportion Hypothesis Tests	
	Day 4	8.3.3 More Proportion Inference	More Proportion Inference	More Proportion Inference	
Week 8	Day 1	Chapter 8 Closure	Khan Academy Practice Test	Khan Academy Practice Test	
	Day 2	9.1.1 Introduction to the Chi-Squared Distribution	Introduction to the Chi Squared Distribution	Introduction to the Chi Squared Distribution	Multiple Choice #1-8 and Free Response #1-2
	Day 3	9.1.2 Chi-Squared Goodness of Fit	Chi-Squared Goodness of Fit	Chi-Squared Goodness of Fit	
	Day 4	9.1.3 More Applications of Chi-Squared Goodness of Fit	Chi-Squared Goodness of Fit	Chi-Squared Goodness of Fit	

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	Day 5	9.2.1 Chi-Squared Test for Independence	Chi Squared Test for Independence	Chi Squared Test for Independence	
Week 9	Day 1	9.2.2 Chi-Squared Test for Homogeneity of Proportions	Chi Squared Test for Homogeneity of Proportions	Chi Squared Test for Homogeneity of Proportions	
	Day 2	9.2.3 Practicing and Recognizing Chi-Squared Inference Procedures	Practicing and Recognizing Chi Squared Inference Procedures	Practicing and Recognizing Chi Squared Inference Procedures	
	Day 3	Chapter 9 Closure	Khan Academy Practice Test	Khan Academy Practice Test	
	Day 4	10.1.1 Quantitative Sampling Distributions	Quantitative Sampling Distributions	Quantitative Sampling Distributions	Multiple Choice #1-10 and Free Response #1-2
	Day 5	10.1.2 More Sampling Distributions	More Sampling Distributions	More Sampling Distributions	
Week 10	Day 1	10.2.1 The Central Limit Theorem	The Central Limit Theorem	The Central Limit Theorem	

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	Day 2	10.2.2 Using the Normal Distribution with Means	Using the Normal Distribution with Means 	Using the Normal Distribution with Means 	
	Day 3	10.3.1 Introducing the t-Distribution	Introducing the t-Distribution 	Introducing the t-Distribution 	
	Day 4	10.3.2 Calculating Confidence Intervals for μ	Calculating Confidence Intervals for μ 	Calculating Confidence Intervals for μ 	
	Day 5	10.3.3 z-Tests and t-Tests for Population Means	z-Tests and t-Tests for Population Means 	z-Tests and t-Tests for Population Means 	

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CPM Stats Assignment, Chapter 5

Multiple Choice

1. Which of the following statements are TRUE?

   I. The Standard Normal curve has a mean of one and a standard deviation of zero.
   II. As the standard deviation gets smaller, the normal curve becomes lower and wider.
   III. By the Empirical Rule 68% of the area under a normal curve is within two standard deviations of the mean.

   A. II and III
   B. II only
   C. none of them
   D. I and II
   E. I and III

2. Which of the following statements are TRUE?

   I. The area under a probability density function is proportional to its height.
   II. By the Empirical Rule 68% of the area under a normal curve is within one standard deviation of the mean.
   III. As the standard deviation gets smaller, the normal curve becomes higher and narrower.

   A. I only
   B. none of them
   C. II and III
   D. I, II and III
   E. I and II

3. Which of the following statements are TRUE?

   I. For a standard normal density function: $P(z < -2) = 0.16$
   II. As the standard deviation gets larger, the normal curve becomes higher and narrower.
   III. By the Empirical Rule 95% of the area under a normal curve is within two standard deviations of the mean.

   A. II only
   B. III only
   C. II and III
   D. I, II and III
   E. I only

4. Which of the following statements are TRUE?

   I. As the standard deviation gets smaller, the normal curve becomes lower and wider.
   II. For a standard normal density function: $P(z < -1) = 0.025$
   III. The area under all probability density functions is equal to 1.

   A. III only
   B. II and III
   C. I, II and III
   D. I only
   E. II only

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5. Which of the following statements are FALSE?

I. As the standard deviation gets smaller, the normal curve becomes higher and narrower.
II. All normal curves are symmetric and bell-shaped.
III. If the domain of a uniform continuous probability density function is $9.0 < X < 34.0$, then $P(20.0 < X < 27.0) = 0.4445$

A. III only
B. I, II and III
C. I only
D. I and III
E. none of them

7. Which of the following statements are FALSE?

I. If the domain of a uniform continuous probability density function is $0.0 < X < 26.0$, then its height is = 0.0445
II. All normal curves are symmetric and bell-shaped.
III. As the standard deviation gets smaller, the normal curve becomes higher and narrower.

A. I only
B. I and II
C. II and III
D. I, II and III
E. III only

6. Which of the following statements are TRUE?

I. If the domain of a continuous uniform probability density function is $8.0 < X < 36.0$, then $P(20.0 < X < 27.0) = 0.2500$
II. All symmetric, bell-shaped curves are normal.
III. For a standard normal density function: $P(z > 2) = 0.16$

A. I only
B. none of them
C. II only
D. I and III
E. I, II and III

8. Which of the following statements are TRUE?

I. The Standard Normal curve has a mean of zero and a standard deviation of one.
II. If the domain of a uniform continuous probability density function is $9.0 < X < 19.0$, then its height is = 0.1515
III. If the domain of a uniform continuous probability density function is $9.0 < X < 19.0$, then $P(13.0 < X < 18.0) = 0.7440$

A. I only
B. II only
C. I and II
D. none of them
E. I and III

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9. Which of the following statements are FALSE? I. By the Empirical Rule 95% of the area under a normal curve is within two standard deviations of the mean. II. All normal curves are symmetric and bell-shaped. III. The Standard Normal curve has a mean of zero and a standard deviation of one. A. none of them B. III only C. I, II and III D. I and III E. I and II	10. Which of the following statements are FALSE? I. By the Empirical Rule 95% of the area under a normal curve is within two standard deviations of the mean. II. All normal curves are symmetric and bell-shaped. III. The Standard Normal curve has a mean of zero and a standard deviation of one. A. none of them B. III only C. I, II and III D. I and III E. I and II

Chapter 5, Free Response

1. Daniella is working at her sister's pharmacy investigating the number of filled prescriptions. Daniella believes the distribution of prescription pain reliever orders are normally distributed with a mean of 24.416 orders/day and a standard deviation of 2.435 orders/day. Sketch the Normal probability density function. What is the 71st percentile filled prescription pain reliever orders?

2. Daniella is working at her grandmother's coffee shop investigating the production of donuts. Daniella believes the distribution of donut calorie counts are normally distributed with a mean of 277.8 Kcal and a standard deviation of 34 Kcal. Sketch the Normal probability density function. What is the probability of selecting a donut calorie count greater than 333.1 Kcal?

3. Mules have 63 chromosomes, while horses have 64 and donkeys have 62. While in Colorado describing threatened populations of mules, Joshua described that the distribution of mule weights are normally distributed with a mean of 558.91 lbs and a standard deviation of 56.99 lbs. Sketch the Normal probability density function. 41 percent of mule weights are more than _____ lbs?

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CPM Stats Assignment, Chapter 6
Multiple Choice

1. What is the standard deviation of the discrete probability distribution?

(X)	1	7	3	6	4	9
P(X)	0.10	0.30	0.07	0.21	0.21	0.11

   A. 2.040
   B. 5.500
   C. 1.428
   D. 5.010
   E. 2.238

2. 3 The chance of an EverCell AAA battery working properly is 62%. You test an "extra value pack" of 7 batteries in your calculator. What is the mean and SD for the distribution of the number of properly working batteries?

   A. Mean: 4.34; SD: 1.284
   B. Mean: 4.34; SD: 1.649
   C. Mean: 4.34; SD: 6.38
   D. Mean: 3.5; SD: 6.38
   E. Mean: 4; SD: 1.284

3. The mean of the distribution of the variable *X* below is 4.04 and the SD is 2.391

(X)	3	4	7	0
P(X)	0.07	0.45	0.29	0.19

   If *Y* is defined as $Y = -3X + 9$, what is the mean of *Y*?

   A. -1.5
   B. 4.04
   C. 3.5
   D. -12.12
   E. -3.12

4. The chance of an EverCell AAA battery working properly is 63%. You test an "extra value pack" of 6 batteries in your calculator. What is the probability at most 3 of the batteries are working?

   A. 0.137
   B. 0.860
   C. 0.394
   D. 0.086
   E. 0.949

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5. A lacrosse goalie is able to block 45% of the shots taken on goal. An opposing team takes 28 shots during a game and each shot is independent of the others. What is the probability exactly 10 shots are blocked?

   A. $({}_{10}C_{28})\ (0.55)^{10}\ (0.45)^{18}$
   B. $1 - ({}_{28}C_{10})\ (0.45)^{28}$
   C. $({}_{28}C_{10})\ (10)^{0.45}\ (10)^{0.55}$
   D. $({}_{28}C_{10})\ (0.45)^{10}\ (0.55)^{18}$
   E. $({}_{18}C_{9})\ (0.45)^{9}\ (0.55)^{18}$

6. A lacrosse goalie is able to block 42% of the shots taken on goal. An opposing team takes many shots during a game and each shot is independent of the others. What is the probability any number *except* 6 shots are taken to get the first block?

   A. geometcdf(p = 0.42, x = 6)
   B. 1 - geometpdf(p = 0.42,x = 6)
   C. binompdf(n = 28, p = 0.42, x = 6)
   D. 1 – geometcdf(p = 0.42, x = 5)
   E. 1 – binomcdf(n = 28, p = 0.42, x = 6)

7. The mean of the distribution of the variable X below is 4.83 and the SD is 2.446

(X)	2	1	0	6	8	3
P(X)	0.19	0.09	0.01	0.41	0.20	0.10

   If Y is defined as $Y = 3X + 29$, what is the mean of Y?

   A. 39
   B. 14.49
   C. 4.83
   D. 43.49
   E. 3.333

8. Assume 61% of firefighters in California have annual incomes of at least $80,000. A sample of 7 firefighters is selected. What is the expected value and standard deviation for the distribution of the number of the firefighters that have incomes at least $80,000?

   A. Mean: 3.5; SD: 6.39
   B. Mean: 4; SD: 0.61
   C. Mean: 4; SD: 1.29
   D. Mean: 4; SD: 6.39
   E. Mean: 4.27; SD: 1.29

9. What is the mean of the discrete probability distribution?

(X)	5	6	9	0	3
P(X)	0.43	0.25	0.13	0.14	0.05

   A. 4.600
   B. 2.455
   C. 0.200
   D. 6.029
   E. 4.970

10. Assume 60% of firefighters in California have annual incomes of at least $80,000. A sample of many firefighters is selected. What is the probability you will need to select more than 3 firefighters to find one with an income of at least $80,000?

    A. 0.904
    B. 0.840
    C. 0.936
    D. 0.064
    E. 0.346

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Chapter 6, Free Response

1. Radius Electronics claims 84% of its πPhones are still working after three years.

A sample of 11 3-year old πPhones is tested. …

a. What is the probability exactly 9 πPhones are still working?
b. What is the probability at most 9 πPhones are still working?

A sample of *many* 3-year old πPhones is tested.

c. What is the probability the tester will need to test at least 9 πPhones to find a working one?

2. At a certain wildlife refuge 42% of the ruddy duck population has selenium levels in their blood which can impair development of their offspring.

   Suppose wildlife managers capture 14 ducks for study. …

A. What is the probability fewer than 6 ducks will have blood levels of selenium high enough to impair development of their offspring?
B. What is the probability at most 6 ducks will have blood levels of selenium high enough to impair development of their offspring?

Suppose wildlife managers capture *many* ducks for study.

c. What is the probability they will have to capture at least 6 ducks to find one with blood levels of selenium high enough to impair development of their offspring?

3. Radius Electronics claims 83% of its πPhones are still working after three years.

A sample of 11 3-year old πPhones is tested. …

i. What is the probability fewer than 10 πPhones are still working?
ii. What is the probability at most 10 πPhones are still working?

A sample of *many* 3-year old πPhones is tested.

i. What is the probability the tester will need to test exactly 10 πPhones to find a working one?

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CPM Stats Assignment, Chapter 7

Multiple Choice

1. If you wish to make a 95% confidence interval of proportions with a margin of error of ± 6.49%, what is the approximate sample size required?

A. 228
B. 280
C. 171
D. 394
E. 195

2. While investigating the proportion of people who have green eye coloring, Tonya was 97% confident the interval from 0.0623 to 0.1986 captured the true proportion. What would be the correct conclusion for the claim p = -0.00?

A. You can reject the claim.
B. You can accept the claim.
C. You cannot fail to prepare without preparing to fail.
D. You can neither accept nor reject the claim.
E. You can bet your bottom dollar.

3. A sample of size 624 was taken from a large population $\hat{p} = 0.2484$ and a margin of error for the population proportion ±2.93% was calculated. What confidence level was used?

A. 97%
B. 95%
C. 99%
D. 91%
E. 93%

4. Match the confidence interval condition I, II, III, with its corresponding property a, b, c.

c. Random selection
d. Independent trials
e. Large counts
a. Requires $n(1 - p) \geq 10$
b. Requires the population to be at least 10 times the sample size if sampled without replacement
c. Assures $\mu_{\hat{p}} = p$

A. I→b, II→a, III→c
B. I→b, II→c, III→a
C. I→a, II→c, III→b
D. I→a, II→b, III→c
E. I→c, II→b, III→a

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5. If 54% of people have a more strict opinion on gun control laws, which of the following represents the approximate probability that a simple random sample of 178 people will contain fewer than 86 people with a more strict opinion on gun control laws?

A. $P\left(z < \frac{86-96}{\sqrt{86(92)/178}}\right)$

B. $P\left(z < \frac{0.54-0.483}{\sqrt{0.483(0.517)/178}}\right)$

C. $P\left(z < \frac{0.483-0.54}{\sqrt{0.483(0.517)/178}}\right)$

D. $P\left(z < \frac{0.483-0.54}{\sqrt{0.54(0.46)/178}}\right)$

E. $P\left(z < \frac{86-96}{\sqrt{0.54(0.46)/178}}\right)$

6. Sophie found a 94% confidence interval from 0.0122 to 0.0296 for the population proportion of people who have a non-major political party affiliation. Sophie is unable to accept or reject which of the following claims:

I. $p \neq 0.03$
II. $p > 0.03$
III. $p < 0.01$

A. I, II and III
B. I and III
C. none of them
D. II and III
E. II only

7. William is collecting data on the proportion of people who have few programming skills and calculated a 96% confidence interval from 0.7690 to 0.8711. Which of the following statements are TRUE?

I. The probability William captured the population proportion of people who have few programming skills in the interval from 0.7690 to 0.8711 is equal to 1.0 or 0.0.
II. If William wanted to decrease the width of the confidence interval, William could increase the sample size.
III. There is a 96% chance the population proportion of people who have few programming skills is between 0.7690 and 0.8711.

A. I and II
B. II only
C. I only
D. none of them
E. I, II and III

8. Given sample proportion = 0.563, x = 45, and a 90% confidence level, what is the appropriate confidence interval?

A. $(0.4582 < p < 0.6668)$
B. $(0.4486 < p < 0.6764)$
C. $(0.4713 < p < 0.6537)$
D. $(0.4654 < p < 0.6596)$
E. $(0.4335 < p < 0.6915)$

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9. You take an SRS of size 334 from the 7896 students at Giant State University (GSU) and calculate the proportion who are studying Economics. You then take an SRS of size 787 from the -1969 students at Mega City College (MCC) and calculate the proportion who are studying Economics. If you could repeat this process many times, which of the following best describes how much your sample proportions would vary?

A. The MCC proportion would vary significantly *less* than the GSU proportion because its population is significantly smaller.

B. The MCC proportion would vary significantly *more* than the GSU proportion because its population is significantly smaller.

C. The variability of the two sample proportions would be about the same, since the sample is less than 10% of the population in both cases.

D. The MCC proportion would vary significantly *less* than the GSU proportion because its sample size is significantly larger.

E. They could vary significantly *or* be about the same; we do not have enough information to decide.

10. A 95% C.I. is made from a simple random sample of size 200 from a population of size 10,000. Which of the following changes would decrease the margin of error?

I. Use a sensible cluster sample instead of an SRS (though the decrease might be difficult to calculate)

II. Measure a proportion with a $\hat{p}$ closer to 0.5

III. Increase the sample size to 400

A. III only
B. I and II
C. I and III
D. I only
E. II only

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Chapter 7, Free Response

1. Davis is collecting data on the proportion of people who have no widows peak. Shari claims that "The proportion of people having no widows peak is greater than 0.69." then Davis found a published survey of 851 randomly selected persons which found 552 people who have no widows peak. Use the results of the survey Davis found to construct a 99% confidence interval and evaluate Shari's claim.

2. Jillian is researching the proportion of people who have an unfavorable opinion of organic food. Alejandro claims that "The proportion of people having an unfavorable opinion of organic food is equal to 0.12." then Jillian found a published survey of 677 randomly selected persons which found 104 people who have an unfavorable opinion of organic food. Use the results of the survey Jillian found to construct a 97% confidence interval and evaluate Alejandro's claim.

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CPM Stats Assignment, Chapter 8

Multiple Choice

1. Which of the following statements are true about Type II error?

I. It is failing to reject the null hypothesis when it is false
II. It is not possible if you accept the alternate hypothesis
III. It is only possible if you fail to accept the alternate hypothesis

A. I and III
B. I, II and III
C. II and III
D. I only
E. II only

2. While studying the proportion of people who have a moderate or less than a pack/day smoking addiction, Jose surveyed 199 people testing the claim $p < 0.08$ and got these results:

H_0: $p = 0.08$
H_a: $p < 0.08$
The sample proportion is $\hat{p} = 0.0503$

Determine the p-value.

A. 0.0609
B. 0.1319
C. 0.3650
D. 0.2916
E. 0.0067

3. When planning a significance test a researcher uses a 0.0900 significance level and designs the experiment to have a power of 0.94 assuming a chosen alternative value of the parameter of interest. Which of the following can be done to increase the power of the test?

I. Decrease cost by cluster sampling
II. Decrease the confidence level
III. Increase the significance level

A. II and III
B. III only
C. I only
D. II only
E. none of them

4. When planning a significance test a researcher uses a 0.01 significance level and designs the experiment to have a power of 0.85 assuming a chosen alternative value of the parameter of interest. What is the chance of making a Type II error under those assumptions?

A. 1.96
B. 0.99
C. 0.85
D. 0.15
E. 0.01

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5. Match the confidence interval condition I, II, III, with its corresponding property a, b, c.

I. Random selection
II. Independent trials
III. Large counts
I. $np > 10$
II. To prevent the systematic favoring of certain outcomes
III. Requires the population to be at least 10 times the sample size

A. I→c, II→b, III→a
B. I→b, II→a, III→c
C. I→b, II→c, III→a
D. I→c, II→a, III→b
E. I→a, II→c, III→b

6. While observing the proportion of people who have an undecided opinion on gun control laws, Jose tested the claim $p < 0.39$ with H_0: $p = 0.39$ and H_a: $p < 0.39$ at a 0.05 significance level, and calculated a p-value of 0.196. What would be the correct conclusion?

A. You can reject the claim.
B. you cannot win 'em all.
C. You can neither accept nor reject the claim.
D. You cannot reject the null hypothesis
E. You can reject the null hypothesis.

7. When planning a significance test a researcher uses a 0.0300 significance level and designs the experiment to have a power of 0.73 assuming a chosen alternative value of the parameter of interest. Which of the following can be done to increase the power of the test?

I. Decrease cost by cluster sampling
II. Decrease the significance level
III. Increase the confidence level

A. II only
B. III only
C. I and II
D. none of them
E. I and III

8. Assume the number of undergraduates at University of Puget Sound is about 2800, while the number of undergraduates at Portland State is about 21000. At each university a SRS of 4% is taken to estimate the proportion of students raised in traditional two parent homes. The resulting sample proportions were nearly identical. The variability associated with the sampling distribution in the

A. Portland State distribution is greater than the University of Puget Sound distribution.
B. University of Puget Sound distribution is greater than the Portland State distribution.
C. University of Puget Sound distribution is about the same as the Portland State distribution.
D. University of Puget Sound distribution is less than the Portland State distribution.
E. none of these

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9. Jillian is looking for the proportion of people who have a favorable opinion of organic food. Diego claims that "The proportion of people having a favorable opinion of organic food is not equal to 0.47." then Jillian found a published survey of 199 randomly selected persons which found 92 people who have a favorable opinion of organic food.

   Using the results of the survey, Jillian evaluated Diego's claim at a 4% significance level where p is "The proportion of people having a favorable opinion of organic food.", H_0 is $p = 0.47$, and H_a is $p \neq 0.47$.

   If Jillian calculated a p-value of 0.8280, which of the following are true statements:

   I. Jillian cannot accept Diego's claim at a 0.04 significance level.
   II. Jillian was willing to take a 4% chance of failing to reject the null hypothesis in error.
   III. Jillian can accept Diego's claim at a 0.04 significance level.

   A. I, II and III
   B. I only
   C. II only
   D. I and II
   E. none of them

10. Kimani is observing the proportion of people who have a trust in government. Jamal claims that "The proportion of people having a trust in government is greater than 0.61." then Kimani found a published survey of 275 randomly selected persons which found 176 people who have a trust in government.

    Using the results of the survey, Kimani evaluated Jamal's claim at a 3% significance level where p is "The proportion of people having a trust in government.", H_0 is $p = 0.61$, and H_a is $p > 0.61$.

    If Kimani calculated a p-value of 0.1539, which of the following are true statements:

    I. Kimani should accept the null hypothesis.
    II. It is possible Kimani may make a type I error in this situation.
    III. Kimani's sample data is quantitative.

    A. I and II
    B. I only
    C. none of them
    D. III only
    E. I and III

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Chapter 8, Free Response

1. Kalani is looking for the proportion of people who have no military veteran status. Daniella claims that "The proportion of people having no military veteran status is not equal to 0.90." then Kalani found a published survey of 432 randomly selected persons which found a 0.9213 proportion of people who have no military veteran status.

Use the results of the survey Kalani found to evaluate Daniella's claim with a hypothesis test at a 0.04 significance level.

2. Jose is collecting data on the proportion of people who have a moderate or less than a pack/day smoking addiction. Davis claims that "The proportion of people having a moderate or less than a pack/day smoking addiction is not equal to 0.07." then Jose found a published survey of 486 randomly selected persons which found 30 people who have a moderate or less than a pack/day smoking addiction.

Use the results of the survey Jose found to evaluate Davis's claim with a hypothesis test at a 0.02 significance level.

3. Julia is researching the proportion of people who have a first birth order among one's siblings. A survey of 443 randomly selected persons in Julia's city found a 0.4560 proportion of people who have a first birth order among one's siblings. Erik is also observing the proportion of people who have a first birth order among one's siblings. A survey of 115 randomly selected persons in Erik's city found 55 people who have a first birth order among one's siblings.

Use an appropriate hypothesis test to determine if Julia's city population proportion of people with a first birth order among one's siblings is less than Erik's city population proportion at a 0.02 significance level:

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CPM Stats Assignment, Chapter 9

Multiple Choice

1. Given the following problem:

Aisha is studying potential relationships between one having an optimistic outlook on the economy and a moderate or less than a pack/day smoking addiction. Assume a survey of 502 randomly selected persons revealed the following data:

		outlook on the economy	
		opt	pes
S_A	H	33	30
	M	12	15
	N	179	233

Are the variables outlook on the economy and smoking addiction associated?

What is the value of the chi-square test statistic?

A. 1.7655
B. 8.0959
C. 5.3424
D. 1.6367
E. 6.6576

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2. Given the following problem:

Julia is describing potential relationships between one having a first birth order among one's siblings and a pessimistic opinion on the direction of the country. Assume a survey of 200 randomly selected persons revealed the following data:

	birth order among one's siblings		
	OLD	YNG	MID
Dir pes	37	30	16
opt	52	42	23

Are the variables birth order among one's siblings and opinion on the direction of the country associated?

Which of the following statements could be used as an alternate hypothesis?

I. birth order among one's siblings and opinion on the direction of the country are not dependent
II. birth order among one's siblings and opinion on the direction of the country are not independent
III. birth order among one's siblings and opinion on the direction of the country are associated

A. II and III
B. I only
C. III only
D. none of them
E. I and II

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3. Given the following problem:

Julia is describing potential relationships between one having a first birth order among one's siblings and a pessimistic opinion on the direction of the country. Assume a survey of 200 randomly selected persons revealed the following data:

	birth order among one's siblings		
	OLD	YNG	MID
Dir pes	37	30	16
opt	52	42	23

Are the variables birth order among one's siblings and opinion on the direction of the country associated?

Which of the following statements could be used as an alternate hypothesis?

I. birth order among one's siblings and opinion on the direction of the country are not dependent
II. birth order among one's siblings and opinion on the direction of the country are not independent
III. birth order among one's siblings and opinion on the direction of the country are associated

A. II and III
B. I only
C. III only
D. none of them
E. I and II

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4. Given the following problem:

Tonya is describing potential relationships between one having green eye coloring and a rural residential demographic. Assume a survey of 401 randomly selected persons revealed the following data:

		eye coloring		
		Br	Gr	Bl
R_D	R	36	10	30
	S	46	13	38
	U	108	31	89

Are the variables eye coloring and residential demographic associated?

Which of the following statements are true about Type I error in this case?

I. Your tolerance for its risk is established with the significance level.
II. It is rejecting the independence of eye coloring and residential demographic when they are actually independent.
III. It is not possible if you accept that eye coloring and residential demographic are associated.

A. I only
B. none of them
C. I and II
D. III only
E. I and III

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5. Given the following situation:

Jose is collecting data on potential relationships between one having a more strict opinion on gun control laws and an undecided opinion of organic food. Assume a survey of 601 randomly selected persons revealed the following data:

	opinion on gun control laws		
	LS	UD	MS
UF	34	31	23
O_F UD	25	73	112
F	11	106	186

Are the variables opinion on gun control laws and opinion of organic food associated?

Which of the following is an appropriate conclusion at a 0.05 significance level?

A. At a 5% significance level there is an association between opinion on gun control laws and opinion of organic food.
B. There is insufficient evidence to show an association between opinion on gun control laws and opinion of organic food.
C. Accept that opinion on gun control laws and opinion of organic food are not associated.
D. There is enough evidence to prove opinion on gun control laws and opinion of organic food are not independent.
E. At a 5% significance level opinion on gun control laws and opinion of organic food are independent.

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6. Given the following problem:

ChocoCorp claims that their delicious chocolate morsels, which come in 5 colors, have the color frequency shown below.

Red	Blue	Green	Yellow	Brown
24%	24%	23%	15%	14%

You take a sample of 339 chocolates and record the frequencies as shown below. Assuming your cluster sample is equivalent to a true SRS of the population, do you have sufficient evidence to conclude ChocoCorp's published distribution is inaccurate?

Sample Data

Red	Blue	Green	Yellow	Brown
90	81	73	57	38

What are the degrees of freedom for the chi-square distribution?

A. 7
B. 3
C. -1
D. 4
E. 8

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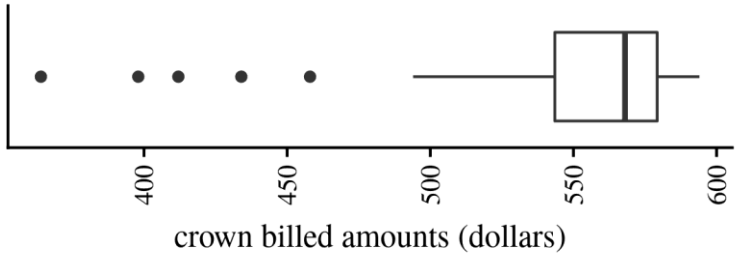
7. Given the following problem:

Aisha is working at her grandfather's dental office observing procedures involving crowns. A stratified sample of 72 crowns produced the billed amount information below.

mean	sd	low	q1	median	q3	high
552.3	45.36	364	543	568	579.5	594



Use the four quartiles as 'bins' to answer the following question:
Are crown billed amounts normally distributed at a 0.03 significance? If you conduct an appropriate statistical test…

What is the value of the chi-square test statistic?

A. 15.4101
B. 25.9423
C. 25.8227
D. 64.9094
E. 74.2197

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8. Given the following problem:

Camila is looking for potential relationships between one having a pessimistic opinion on the direction of the country and an unfavorable opinion of organic food. Assume a survey of 199 randomly selected persons revealed the following data:

	opinion on the direction of	
	pes	opt
O_F UF	15	12
O_F UD	28	39
O_F F	40	65

Are the variables opinion on the direction of the country and opinion of organic food associated?

What are the degrees of freedom for the chi-square distribution?

A. 6
B. 5
C. 3
D. 7
E. 2

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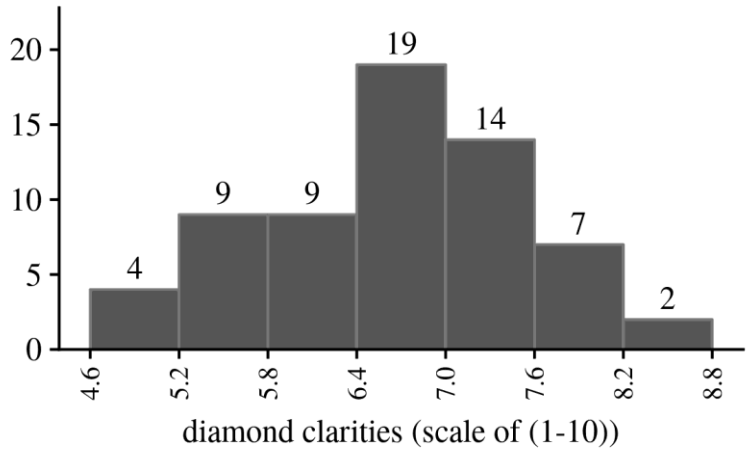
Chapter 9, Free Response

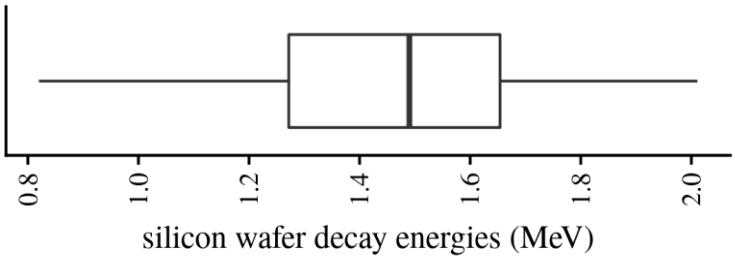
1. The word diamond comes from an ancient Greek word meaning unbreakable. While in South Africa collecting data on various supplies of diamonds, Jacob observed a stratified sample of 64 diamonds which showed the clarity results below.



Are diamond clarities uniformly distributed at a 0.04 significance? Conduct an appropriate statistical test.

2. Pure silicon is used to make semiconductors, which appear in most electronics. Jacob is in California observing natural inventories of silicon wafers. An SRS of 68 wafers produced the decay energy results below.

mean	sd	low	q1	median	q3	high
1.459	0.276	0.82	1.265	1.49	1.654	2.011



Use the four quartiles as 'bins' to answer the following question:
Are silicon wafer decay energies normally distributed at a 0.06 significance? Conduct an appropriate statistical test.

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CPM Stats Assignment, Chapter 10

Multiple Choice

1. Assume a random sample is taken from a very large population in hopes of performing an inference procedure for the population mean. Consider the following information:

   i. The population standard deviation is not known
   ii. The population is distribution shape is not known
   iii. n ≥ 30

   If your intent is to perform the most powerful test available, which of the following represents your best next step?

A. Make a boxplot or histogram of the sample data looking for strong skew or influential outliers. Then use the t-distribution if appropriate.
B. Calculate the r-squared and consider the strength of the linear relationship.
C. Continue sampling until n ≥ 30 and use the z-distribution.
D. Continue the analysis using the z-distribution.
E. Continue the analysis using the t-distribution.

2. How does doubling the sample size change the width of a confidence interval?

a. It divides the interval width by $\sqrt{2}$
b. It multiplies the interval width by $\sqrt{3}$
c. It divides the interval width by 2
d. It divides the interval width by $\sqrt{3}$
e. It multiplies the interval width by $\sqrt{2}$

3. A sample of size 37 was taken from a large population where $\bar{x}$ = 152.0, s = 65.77 and a margin of error for the population mean of ± 21.9 tons were calculated. What confidence level was used?

a. 93
b. 97
c. 95
d. 99
e. 91

4. Given a sample mean of 547.6 picojoules, a sample standard deviation of 83.81 picojoules, a sample size of 28 and a 93% confidence level, what is the appropriate confidence interval?

a. (511.31 < μ < 583.89) picojoules
b. (519.75 < μ < 575.45) picojoules
c. (515.10 < μ < 580.10) picojoules
d. (503.72 < μ < 591.48) picojoules
e. (517.72 < μ < 577.48) picojoules

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5. A finite sample of size n is to be taken from a large population and a confidence interval for the population mean calculated. In general, which situation will yield the largest margin of error?

a. a larger confidence level using the z statistic
b. a smaller confidence level using the z statistic
c. it is not possible to know without the sample size
d. a larger confidence level using the t statistic
e. a smaller confidence level using the t statistic

6. The following 90% confidence interval of means was calculated from a Normally distributed population with a standard deviation of 2.34:
C.I. = $(40.18 < \mu < 41.82)$
What was the approximate sample size?

a. 34
b. 22
c. 29
d. 25
e. 44

7. Which of the following formulas best represents the standard error of a sample mean?

a. $\frac{\overline{x}-\mu}{s/\sqrt{n}}$
b. $\frac{s}{\sqrt{n}}$
c. $\frac{\hat{p}-p}{\sqrt{p(1-p)/n}}$
d. $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
e. $z^*\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$

8. Deion is investigating the population mean of steel carbon contents and calculated a 92% confidence interval from 0.8161 to 1.0991 %. Which of the following statements are FALSE?

i. About 92% of steel carbon contents are between 0.8161 and 1.0991 %.

ii. If another sample were taken, there is a 92% chance the interval would contain 0.9576

iii. If Deion were to repeat this sampling process many-many times, this method would capture the true mean 92% of the time.

a. I only
b. none of them
c. I and III
d. I and II
e. II and III

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9. Which of the following statements are TRUE?

i. The t-distribution is not used with inference of proportions.
ii. If the population standard deviation is unknown, you may not use the z-distribution for tests of means.
iii. The CRITICAL t statistic for confidence interval procedures is $t = \frac{\overline{x}-\mu}{s/\sqrt{n}}$.

A. none of them
B. I, II and III
C. III only
D. I and III
E. I and II

10. Which of the following statements are true about Type I error?

I. It is only possible if you accept the alternate hypothesis
II. It is much less common than a Type II error
III. It is not possible to calculate without an additional assumed value of the parameter

A. I, II and III
B. I and II
C. I only
D. II only
E. III only

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Chapter 10, Free Response

1. While working at her brother's pizzeria investigating the making of combination pizzas, Aisha observed that the distribution of pizza amount of meats are normally distributed with a mean of 12.81 ounces and a standard deviation of 2.4 ounces.

a. Sketch the Normal probability density function. What is the probability of selecting a single combination pizza amount of meat less than 15.21 ounces?

b. In a sample of 14 combination pizzas, what is the probability that exactly 12 are less than 15.21 ounces?

c. What is the probability of selecting a sample of 14 combination pizzas with a mean amount of meat less than 15.21 ounces?

2. Aisha is working at her father's gym describing the level of fitness of the members. Aisha believes the distribution of member standing broad jump distances are normally distributed with a mean of 89.4 cm and a standard deviation of 18.13 cm.

a. Sketch the Normal probability density function. What is the probability of selecting a single the member standing broad jump distance less than 103 cm?

b. In a sample of 14 the members, what is the probability that more than 8 are less than 103 cm?

c. What is the probability of selecting a sample of 14 the members with a mean standing broad jump distance less than 103 cm?

3. Hurricanes in the southern hemisphere rotate clockwise while hurricanes in the northern hemisphere rotate counterclockwise. Jacob is in Florida studying toxic deposits of hurricanes. An SRS of 33 hurricanes gave the radius results below.

sample mean = 448.6, s = 61.04 (kilometers)

Alexis claims that "The mean hurricane radius is greater than 438.26 kilometers."

Use the data to evaluate Alexis's claim at a 0.10 significance level.

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