Algebra 2

2015 Winter Break Packet – Student

Department of Mathematics
Office of Academics and Transformation

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Inferences and Conclusions from Data

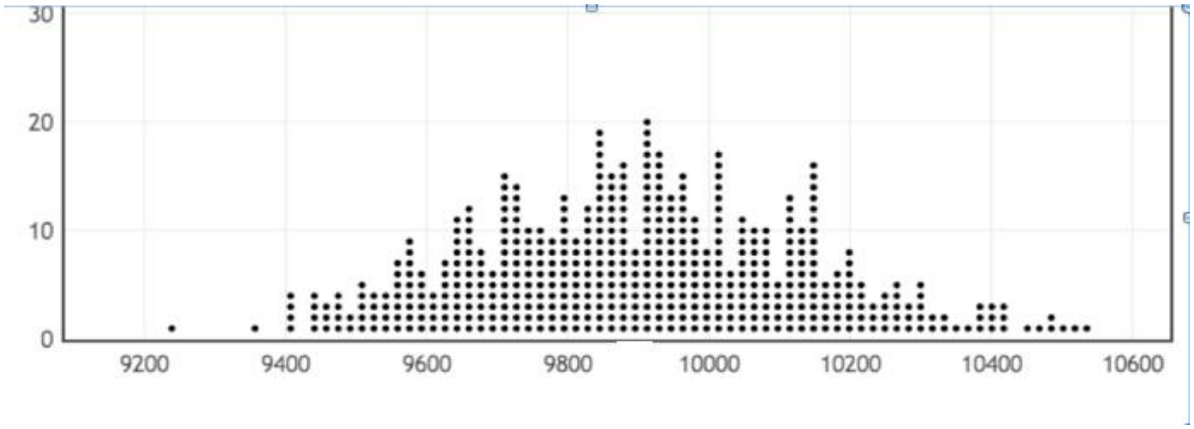
Task 1

1. The distribution of cholesterol levels in teenage boys is approximately normal with μ = 170 and σ = 30. A random sample of 30 boys in your community has a sample mean cholesterol level = 190.

Use the applet at http://www.rossmanchance.com/applets/SampleMeans/SampleMeans.html to design and perform a hypothesis test to see if the boys in our community have an especially high cholesterol level.

Task 2

According to the website, http://infovis.kitware.com/hospital-costs/, the mean charge for treating pneumonia at a Maryland hospital is μ=$9,886.98 with a standard deviation σ=$1662.80. You have examined the 15 hospitals closest to you and found a sample mean cost of treating pneumonia of $\bar{x} = \$10{,}400$. A simulation was run and 500 samples of size 15 were generated. The results are shown in the graph below.



a. If the true mean cost of treatment for pneumonia in Maryland hospitals is $9886.98, how likely is it that we will get a sample mean of $10,400 or higher? Justify your answer.

b. Do you have any concerns about the procedures used here?

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Task 3

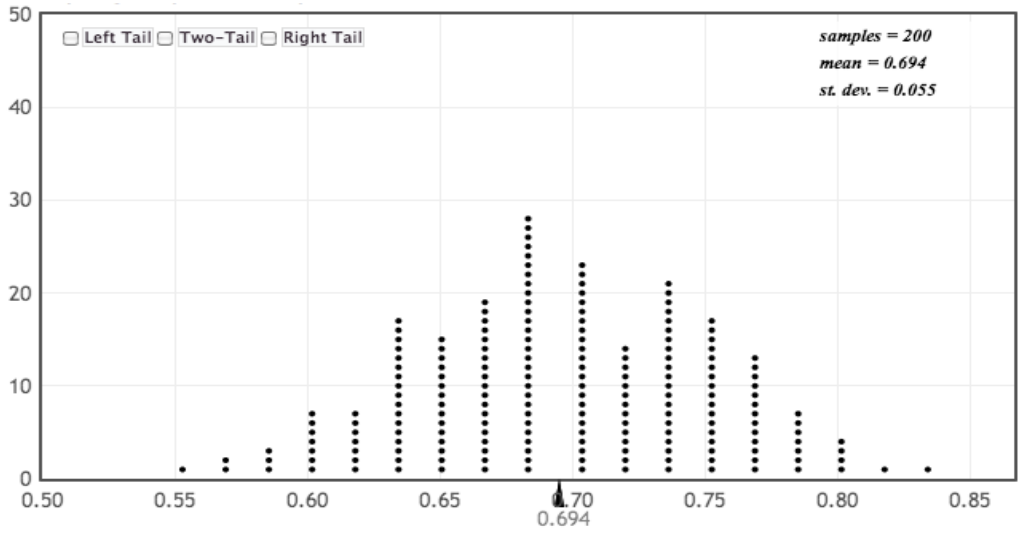
Before first period one day last week Jase surveyed 200 students of the 1300 in his school to determine how many times they had been late to school. He found that 17 of surveyed students had been late at least 5 times. With this sample data, he found a 95% confidence interval of (0.04635, 0.12365) and concluded that no more than 12.365% of the student body will be late 5 or more times.

Which of the following are concerns about Jase's survey? Check all that apply and give a reason for each.

- ☐ Jase's sample size is too small.
- ☐ Jase only surveyed students on one day.
- ☐ Jase only surveyed students who were at school before 1st period.
- ☐ Jase constructed a confidence interval on a sample that may not be representative.
- ☐ Jase is misinterpreting his confidence interval to indicate that any percentage beyond 12.365% is not possible.
- ☐ Jase's confidence interval has been calculated incorrectly

Task 4

A national fast food chain has stated that 70% of their customers order a combo meal instead of ordering individual items. Your local restaurant found that 80% of customers order the combo meal. A 200-trial simulation was run with the assumption that 70% of customers order a combo meal. The results of the simulation are shown in the dot plot below.



a. According to the simulation, how likely is the occurrence that at least 80% of the customers purchase combo meals?
b. What (if anything) does this suggest about the national percentage of customers who buy combo meals?

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Probability of Compound Events

Task 1

Far Flight High School has 162 students enrolled in French, 294 students enrolled in Spanish, and 78 students taking both languages. The remaining 132 students do not take a language. Find each of the probabilities below and use appropriate notation to summarize the event.

a. What is the probability that a student takes French or Spanish or both?
b. What is the probability that a student takes French and Spanish?
c. What is the probability that a student does not take French?
d. How would you describe the students you would include if you were considering the complement of $P(French \cap Spanish)$? What is the probability of this occurring?

Task 2

(Adapted from NCTM Mathematics Assessment Sampler Grades 9-12)

Twenty-five people watched a movie showing at the AMC Theater. Of them, fifteen order a drink, ten order popcorn, and nine order candy. Two people order all three items, one orders a drink and candy, three order a drink and popcorn, and one orders popcorn and candy.

a. Display the results in a Venn diagram.
b. What is the probability that a moviegoer who buys a drink will also buy popcorn?

Task 3

The Bar Harbor Boating Company in Maine offers 3 boating tours: Just Whale Sightings, Just Puffin Sightings, and Whale and Puffin Sightings. The manager would like to guarantee the sighting of whales and/or puffins on all of the tours or he would give his customers a full refund, however, he is worried he might lose too much money. If the proportion of sighting only a whale is 0.75, the proportion of sighting only a puffin is 0.95, and the proportion of sighting a whale and puffin is 0.72, set up a two-way table. Then, use what you know about calculating probability to make a recommendation to the manager whether or not he should guarantee sightings for each tour. Include a two-way table to support your recommendation.

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