Stat 202
Spring 2015
Exam 1
2/13/15
Time Limit: 75 Minutes

Name (Print): _____

This exam contains 6 pages (including this cover page) and 5 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books, or notes. You may use a computer—either your own or one from the lab—but only for StatCrunch, for accessing the data on my website, and for the calculator app. No other apps or websites may be open. You may *not* access the lecture notes or homework on my website. In addition to your computer, you may use a calculator, as long as it doesn't have internet. You may *not* use your cell phone during the exam.

You are required to show your work on each problem on this exam. The following rules apply:

- **Organize your work**, in a reasonably neat and coherent way, in the space provided.
- **Mysterious or unsupported answers will not receive full credit**. A correct answer, unsupported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit. Graphing calculators should not be needed, but they can be used to check your work. If you use a graphing calculator to find an answer you must write the steps needed to find the answer, without the calculator.
- **For problems requiring StatCrunch, report all numbers you enter as input, otherwise you won't get partial credit for an incorrect answer.**
- If you need more space, use the back of the pages; clearly indicate when you have done this.
- Do not write in the table to the right.

Problem	Points	Score
1	20	
2	25	
3	25	
4	15	
5	15	
Total:	100	

1. (20 points) Consider the following sample space: $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$. The random phenomenon being modeled is the toss of a single 12 sided die. But this die is not fair. The die is loaded (meaning the sides are not weighted equally), so that the "1" face has a probablity 0.1 of appearing, the "12" face has a probability 0.1 of appearing, and the other faces are equally likely to appear. Consider the following events: "ODD" is the event that the number showing is odd, "EVEN" is the event that the number showing is even, "SIX" is the event that the number showing is 6.

   (a) (5 points) What is the probability of EVEN $\cup$ ODD?

   Probability(Even $\cup$ Odd) = 1

   (b) (5 points) What is the probability of EVEN $\cap$ ODD?

   Probability (Even $\cap$ Odd) = 0

   (c) (5 points) What is the probability of SIX?

   P(1) = P(12) = .1

   P(2-11) = .8

   P(6) = .08

   (d) (5 points) What is the probability of SIX^C, meaning the complement of SIX?

   Probability (SixC) = .92

2. (25 points) Load the data set "longleaf" available from my website http://www.seancarver.org/ in the same place where you have been getting data all semester long (specifically, the Data section, Chapter 1 subsection, of the Stat 202 materials page which is accessible from the website's main page). The data report the diameters of long leaf trees in an old growth forest.

   (a) (5 points) What is the mean and standard deviation of the diameter of the trees in the forest?

mean 27.29
Std. Dev. 17.7058

   (b) (5 points) What is the z-score of the first tree in the data set (which has a diameter of 10.5)?

-0.94827

   (c) (5 points) Report the five-number summary of the data.

(2.2, 10.95, 28.5, 41.9, 69.3)

   (d) (5 points) Report the interquartile range. What is the upper endpoint for range of diameters that will not be flagged as suspected outliers by the 1.5 × IQR rule?

$IQR = Q_3 - Q_1 = 30.95$

Upper end point $= Q_3 + 1.5\,IQR = 88.325$

   (e) (5 points) Are the data approximately normal? Justify your answer. What is the best (most sensitive) way of judging normality that we have learned in this class?

No not normal
The QQ plot (best way learned so far) shows deviations from linear,

3. (25 points) IQ scores are approximately normal and the index is scaled so that the general population has mean 100 and the standard deviation 15.

(a) (5 points) What IQ score is needed to be in the top 1% for intelligence?

134.895

(b) (5 points) On what percentile does an IQ score of 120 fall?

from Stat Crunch 0.9088 90.9 percentile

(c) (5 points) What proportion of the population has an IQ score between 85 and 115?

~~68.269 %~~

or proportion 0.68269

(d) (5 points) What z-score corresponds to an IQ score of 115?

$\frac{115 - 100}{15} = 1$ 1

(e) (5 points) What IQ score does a z-score of -1.2 correspond to?

$\frac{x - 100}{15} = -1.2$

$x = 100 - 1.2(15)$

82

4. (15 points) A large urn contains 1000 poker chips. Of the chips in the urn, 100 are blue, 200 are red, the rest are white. In addition to having a color, the chips have each have a label: they are labeled as either "Casino Royal" or "Lucky Seven," depending on which casino they came from: 900 come from Casino Royal and the rest from Lucky Seven. A random chip is selected from the urn. Each chip has an equal probablity of being selected.

   (a) (5 points) What is the probability of drawing a blue chip?

$\frac{100}{1000} = .1$ **.1**

   (b) (5 points) What is the probability of drawing a Casino Royal chip?

$\frac{900}{1000} = .9$

   (c) (5 points) Suppose the events "draw a blue chip" and "draw a Casino Royal chip" are independent. What is the probability of drawing a chip that is both a blue chip and a Casino Royal Chip?

.09

5. (20 points) Consider a 10-sided fair die, with faces labeled 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. Because the die is fair, each side has an equal probability of appearing when rolled.

   (a) (5 points) What is the probablity of 2 appearing at least once in 4 successive rolls of the die?

0.3439

   (b) (5 points) What is the probability that 5 or 10 will appear at most twice is 6 successive rolls of the die?

0.90112

   (c) (5 points) What is the probablity that 3 will appear exactly once in 10 rolls of the die?

0.05739