

Statistics - Final Exam - May 2016

Answer all seven questions. You may use statistical software, a calculator, your notes, books and other sources including the internet, but be sure to carefully cite all references - including the textbook and Jim's class notes. You may not ask people for help, except for asking me (mahoney@marlboro.edu) for clarifications. You have 24 hours to complete the exam, so it's due back to me via email or under my office door (Sci 217) by noon on Monday. Express your arguments clearly and carefully and state any additional assumptions that are required to answer the questions. How you reach an answer is at least as important as the answer itself - you're being graded on your demonstration that you know what's going on. Good luck!

1. A study of 20 randomly selected students found that they spent an average of \$16.92/week on gas. The standard deviation of the sample was \$3.10. Find the 99% confidence interval of the true mean.

2. A variable is normally distributed with mean 52.1 and standard deviation 4.6. What is the probability that a randomly chosen variable lies between 58 and 61? What value marks the 90th percentile?

3. Here are the three year rates of return on various mutual funds:

5.37	4.31	4.13	8.58	5.99	7.90	9.11	6.11
3.06	14.48	12.50	8.33	10.10	8.21	6.83	10.94
2.34	0.97	8.33	8.89	6.07	6.50	5.99	9.38
0.05	13.88	3.71	10.07	9.88	4.93	6.38	10.34
2.27	11.91	11.69	12.06	9.84	7.75	2.86	6.68

Display these data in an appropriate graph. What are the mean, median, and standard deviation of these data? How are those values calculated?

4. You will roll a single fair six-sided die successive times, adding the score as you go. Stop when you have either scored at least 6 or rolled the die 3 times. What's the probability that you take exactly two rolls? What is the expected value of the number of rolls?

5. It is claimed that a particular diet regime helps weightlifters improve their performance. Below are the data for eight weightlifters' maximum achieved bench press in pounds, both before the regime and after the regime has been in place for a month. Is the regime effective? (Assume that the variable is approximately normally distributed.) Include with your argument a plot that supports your conclusion.

Weightlifter	1	2	3	4	5	6	7	8
Before	210	230	182	205	262	253	219	216
After	219	236	179	204	270	250	222	216

6. A town has two candidates running for office, John Smith and Jane Doe. Describe how you would design and implement a survey to see if John is more popular than Jane. Invent some reasonable data that you might get, draw a conclusion from that data, and explain what you did and why you reached that conclusion. As usual, a plot of some sort wouldn't hurt. What assumptions are you making, and how might you check them? What can you say about the probability that your conclusion is incorrect?

7. When talking about the spread of something from the mean, sometimes we use the standard deviation σ but other times the formula σ/\sqrt{N} . What's the difference, and when is each appropriate? Given a specific example of each case.