201-922-DW Introductionto Statistics
Take-Home Assignment #1
Due Friday, November 20th 2015, 1pm

1- A certain population has a mean of 500 and a standard deviation of 30. Many samples of size 36 are randomly selected and the means calculated.

  (a) What value would you expect to find for the mean of all these sample means?
  (b) What value would you expect to find for the standard deviation of all these sample means?
  (c) What shape would you expect the distribution of all these sample means to have?

2- WageWeb provides compensation information and services on more than 160 positions. As of October 1, 2003, the national average salary for a registered nurse was $47,858. Suppose the standard deviation is $7,750.

  (a) Find the probability that the mean of a sample of 100 such nurses is less than $45,000.
  (b) Find the probability that the sample mean of a sample of 100 such nurses is between $46,000 and $48,000.
  (c) Find the probability that the sample mean of a sample of 100 such nurses is greater than $50,000.

3- State the null hypothesis, Ho, and the alternative hypothesis, Ha, that would be used to test each of the following claims:
  (a) A chicken farmer at Best Broilers claims that hischickens have a mean weight of 56 oz.
  (b) The mean age of U.S. commercial jets is less than 18 years.
  (c) The mean monthly unpaid balance on credit card accounts is more than $400.

4- Determine the critical region and critical values for z that would be used to test the null hypothesis at the given level of significance, as described in each of the following:
  (a) H_o: $\mu = 20$, H_a: $\mu \neq 20$, $\alpha = 0.1$
  (b) H_o: $\mu = 24$, H_a: $\mu > 24$, $\alpha = 0.01$
  (c) H_o: $\mu = 10.5$, H_a: $\mu < 10.5$, $\alpha = 0.05$
  (d) H_o: $\mu = 35$, H_a: $\mu \neq 35$ $\alpha = 0.01$

5- A student group maintains that each day, the average student mus ttravel for at least 25 minutes one way to reach college. The college admissions office obtain a random sample of 31 one-way travel times from students. The sample had a means of 19.4 minutes and a standard deviation of 9.6 minutes. Does the admissions office have sufficient evidence to reject the students' claim? Complete a hypothesis test with $\alpha = 0.01$.

6- A nationwide random sample of college students revealed that 24 students consumed a total of 5,428mg of caffeine each day, with a standard deviation of 48mg. Assuming that the amount of caffeine consumed per person daily is normally distributed, is there sufficient evidence to conclude that the mean amount of caffeine consumed daily by college students is less than 250mg, using $\alpha = 0.05$?

7- To test the null hypothesis "the mean weigh for adult males equals 160 lb" against the alternative "the mean weight for adult males exceeds 160 lb", the weight of 16 males were obtained:

| 173 | 178 | 145 | 146 | 157 | 175 | 173 | 137 |
| 152 | 171 | 163 | 170 | 135 | 159 | 199 | 131 |

Assume normality and run a hypothesis test with $\alpha = 0.1$.

8- A fire insurance company thought that the mean distance from a home to the nearest fire epartment in a suburb of Chicago was at least 4.7 miles. It sets its fire insurance rates accordingly. Members of the community set out to show that the mean distance was less than 4.7 miles. This, they thought, would convince the insurance company to lower its rates. They randomly identified 64 homes and measured the distance to the nearest fire department from each. The resulting sample mean was 4.4 miles. If $\sigma = 2.4$ miles, does the sample show sufficient evidence to support the community's claim at the $\alpha = 0.05$ level of significance?