# Math 13 - Practice Test 3, Spring 2016

**Name:** _____ **Class Number:** _____

Write down all your steps and include drawings of normal curves.

**1)** The scores on the comprehensive final exam for a college course were normally distributed, and the z-scores for some of the students are shown below:

- Robert: 1.10
- Juan: 1.70
- Susan: -2.00
- Joel: 0.00
- Jan: -0.80
- Linda: 1.60

a. Which of these students scored above the mean?
b. Which of these students scored on the mean?
c. Which of these students scored below the mean?
d. If the mean score was $\mu = 150$ with standard deviation $\sigma = 20$, what was the final exam score for each student?

**2)** The number of bottles of shampoo sold monthly by a local drugstore is a normal random variable with mean 212 and standard deviation 40. Find the probability that the next month's shampoo sales will be:

a. Greater than 200
b. Less than 250
c. Greater than 200 but less than 250

**3)** Weight of adult green sea urchins are normally distributed with mean 52.0 grams and standard deviation 17.2 grams.

a. Find the percentage of adult green sea urchins with weights between 50g and 60g.
b. Obtain the percentage of adult green sea urchins with weights above 40g.
c. Determine the 90th percentile for the weights of adult green sea urchins.

**4)** The times of the finishers in the New York City 10-km run are normally distributed with mean 61 minutes and standard deviation 9 minutes.

a. Determine the percentage of finishers with times between 50 and 70 minutes.
b. Determine the percentage of finishers with times less than 75 minutes.
c. Obtain the first (25%) and third (75%) quartiles for the finishing times.

**5)** Consider a sample size of 50 from a population having mean = 100 and standard deviation = 9. What is the probability that the sample mean $\bar{X}$ lies between 96 and 104?

**6)** A random sample of n = 36 coffee shops gave a sample mean price of $\bar{X} = \$3.45$ for a cappuccino. Assume that the standard deviation is known with a value of $\sigma = \$0.84$.

a. What's the probability that the mean price $\bar{X}$ lies between \$3.30 and \$3.70.
b. Find the 90% confidence interval for the average price $\bar{X}$ of a cappuccino.
c. What's the margin of error (using a 90% confidence level)?

**7)** A pilot study has revealed that the standard deviation of workers' monthly earnings in the chemical industry is \$180. How large a sample must be chosen to obtain an estimator of the mean salary that, with 90% confidence, will be correct within ± \$20?

**8)** It is known that the standard deviation of the weight of a newborn child is 10 ounces. If we want to estimate the average weight of a newborn, how large a sample will be needed for the standard error of the estimate to be less than 3 ounces?

**9)** The National Center for Educational Statistics recently chosen a random sample of 2000 newly graduated college students and queried each one about the time it took to complete his or her degree. If the sample mean was $\bar{X} = 5.2$ years with a sample standard deviation $S = 1.2$ years, use the t-distribution to construct:

a. A 95% confidence interval for the mean completion time of all newly graduate students.
b. A 99% confidence interval.

**10)** The manager of a shipping department has been receiving complaints about the length of time it takes for customers in California to receive their orders. To learn more about this potential problem, the manager chose a random sample of 12 orders and then checked to see how many days it took to receive each of these orders. The resulting data were: 15, 20, 10, 11, 7, 12, 9, 12, 8, 13, 16

a. Find the sample mean $\bar{X}$
b. Find the sample standard deviation $S$ c.Find a 90% confidence interval for the mean time it takes California customers to receive their orders. (Hint: use the t-distribution)

**11)** The following are the losing scores in 7 randomly chosen Super Bowl football games: 10, 16, 20, 17, 31, 19, 14

Use the t-distribution to construct a 95% confidence interval of the average losing score in a Super Bowl game.

**12)** The sample mean of the scores on a economics exam was 60 with a sample standard deviation of 20, while the sample mean of the scores on a statistics exam was 55 with a sample standard deviation of 10. Joe scored 70 on the economics exam and 62 on the statistics exam. Assume that the tests scores on both exams approximately follow a normal distribution.

a. On which exam is the percentage of scores that are below Joe's score the highest?
b. Approximate the percentage of scores on the economics exam that were below Joe's score?
c. Approximate the percentage of scores on the statistics exam that were below Joe's score?