

Assignment 6 (Part I)

November 12, 2000

****Note:** This assignment is due Monday November 20th at 12:30 p.m. along with Assignment 6 (Part II). Part II is available in a separate PDF file online.

1. The SAT is standardized to be normally distributed with a mean $\mu = 500$ and a standard deviation $\sigma = 100$. What percentage of SAT scores falls
 - a) Between 500 and 600?
 - b) Between 400 and 600?
 - c) Between 500 and 700?
 - d) Between 300 and 700?
 - e) Above 600?
 - f) Below 300?
2. For the SAT, determine the z score that each of the following scores falls from the mean:
 - a) 500
 - b) 400
 - c) 650
 - d) 575
 - e) 750
 - f) 380
3. Using the z scores calculated in Problem 12 and Table A, what is the percentage of SAT scores that falls
 - a) 500 or above?
 - b) 400 or below?
 - c) Between 500 and 650?
 - d) 575 or above?
 - e) Between 250 and 750?
 - f) 380 or above?
4. A communication researcher was interested in studying the length of major motion pictures. Collecting data on all feature films produced since 1988, she found that their lengths were normally distributed with a mean length of 106 minutes and a standard deviation of 8 minutes. Determine
 - a) the percentage of films that last 2 hours or more.
 - b) The probability that a particular film lasted 2 hours or more.
 - c) The probability that two films lasted 2 hours or more.

5. Assume that scores among Asian-Americans on an alienation scale are normally distributed with mean = 22 and standard deviation = 2.5 (with higher scores reflecting greater feelings of alienation). Based on this distribution determine
- the probability of an Asian-American having an alienation score between 22 and 25.
 - The probability of an Asian-American having an alienation score of 25 or more.
6. Suppose that the population standard deviation σ for a normally distributed standardized achievement test is known to be 7.20.
- What would the standard error of the sample mean be if we were to draw a random sample of 16 test scores?
 - Suppose that the random sample produced these observed scores:

6	5	6	12	5	10	11	13
12	10	9	20	23	20	28	18

Find the 95% confidence interval for the mean.

- Find the 99% confidence interval for the mean.

7. Estimate the standard error of the mean with the following sample of 34 scores on a 10-item objective test of political name recognition:

10	1	4	8
10	7	5	5
5	6	6	10
7	6	3	8
5	7	4	7
4	6	5	5
6	5	6	4
7	3	5	4
8	5		

- With the sample mean from above, find the 95% confidence interval.
 - Find the 99% confidence interval.
8. A medical researcher wants to determine how long patients survive once diagnosed with a particular form of cancer. Using data collected on a group of 20 patients with the disease, she observes an average survival time (time until death) of 38 months with a standard deviation of 9 months. Using a 95% level of confidence, estimate the population mean survival time.

9. A local police department attempted to estimate the average rate of speed ($\hat{\mu}$) of vehicles along a strip of High Street. With hidden radar, the speed of a random selection of 25 vehicles was measured, which yielded a sample mean of 42 mph and a standard deviation of 6 mph.
 - a. Estimate the standard error of the mean.
 - b. Find the 95% confidence interval for the population mean.
 - c. Find the 99% confidence interval for the population mean.

10. A statistics professor is interested in determining the average score on his midterm examination ($\hat{\mu}$). Using a random number table, he selects 30 students and notes their test scores. The sample mean was 78 and the standard deviation was 12.
 - a. Estimate the standard error of the mean.
 - b. Find the 80% confidence interval for the population mean.
 - c. Find the 89% confidence interval for the population mean.