

SOLUTIONS: SAMPLING DISTRIBUTIONS

PROBLEM 1.

A laptop manufacturer finds that the average time it takes an employee to load a laptop with software is 50 minutes with a standard deviation 20 minutes. Suppose you take a random sample of 100 employees. The standard deviation of the sample mean is:

The standard error of the mean = $20 / \sqrt{100} = 2$

PROBLEM 2.

A company that manufactures bookcases finds that the average time it takes an employee to build a bookcase is 25 hours with a standard deviation of 9 hours. A random sample of 81 employees is taken. What is the likelihood that the sample mean will be 26 hours or more?

Standard error of the mean = $9 / \sqrt{81} = 1$; Thus, the 26 becomes 1 in Z terms $[(26 - 25) / 1]$

Answer = .5000 - .3413 = .1587

PROBLEM 3.

The average grade point average (GPA) of undergraduate students in New York is normally distributed with a population mean of 2.5 and a population standard deviation of .5.

(I) The percentage of students with GPA's between 1.3 and 1.8 is: (a) less than 5.6%
 (b) 5.7% (c) 5.9% (d) 6.2% (e) 6.3% (f) 6.6% (g) **7.3%** (h) 7.5%
 i) 7.9% (j) more than 8%.

.4918 - .4192 = .0726 Choice g

(II) The percentage of students with GPA's above 3.6 is: (a) less than 1% (b) 1.2%
 (c) **1.4%** (d) 1.6% (e) 1.9% (f) 2.2% (g) 2.5% (h) 2.7% (i) 3.0%
 (j) more than 3%.

.5000 - .4861 = .0139 Choice c

- (III) Above what GPA will the top 3% of the students be (i.e., compute the 97th percentile):
(a) less than 2.98 (b) 2.98 (c) 3.04 (d) 3.14 (e) 3.22 (f) 3.31 **(g) 3.44**
(h) 3.57 (i) 3.64 (j) more than 3.64.

Z-score of 1.88 corresponds to a 97th percentile. $X = 3.44$ Choice g

- (IV) If a sample of 25 students is taken, what is the probability that the sample mean GPA will be between 2.50 and 2.75? (a) less than .10 (b) .122 (c) .243 (d) .307 (e) .346
(f) .38 (g) .42 (h) .44 **(i) .494** (j) more than .494.

Remember that the standard error of the mean is $.5/\sqrt{25} = .10$ You have to work with the value of .10. $Z = (2.75 - 2.50)/.10 = 2.50$ Using the Z-table, the probability from 0 to 2.50 is .4938. Answer is i.