7.16. A random sample of $n$ elements is selected from a population with std. dev. $\sigma = 1$. Find the standard error (SE) of the mean.

(a) $n = 1$ S.E. = 

(c) $n = 4$ S.E. = 

(g) $n = 100$ S.E. = 

7.17. If a single balanced die is rolled, the mean of the number that comes up is 3.5 with std. dev. $\sigma = 1.7078$.

(b)(2) Suppose $n = 4$ die are rolled and you measure the average $\bar{x}$ of the 4 numbers. Try using the Central Limit Theorem to find the mean and std. dev. of $\bar{x}$.

$\mu_\bar{x} =$ _ _ _ 

SE = _ _ _ 

The actual answer is 1.708, $n = 4$ is too small to accurately use this theorem.

7.18. A sample of 25 observations is selected from a normal population with mean 106 and std. dev. 12.

(a)(2) Find the mean and std. dev. of the sampling distribution of $\bar{x}$.

$\mu_{\bar{x}} =$ _ _ _ 

$\sigma_{\bar{x}} =$ _ _ _ 

(b) Find the probability that $\bar{x}$ exceeds 110.

(c) Find the probability that the sample mean deviates from the population mean 106 by no more than 4.

7.22. College professors earn an average of $52,500 per year with a standard deviation of $4000. To verify this fact, a sample of 60 professors is selected.

(a)(2) Find the mean & std. dev. of the sample average $\bar{x}$.

(b) Within what limits will 95% of the sample means lie? Check 25, 26.

(c) Find the probability the sample mean is > $55,000.

(d) If your sample's mean was $55,000, would this be unusually high? By unusual, we mean an event with probability $\leq 5\%$. yes? no?

7.24. Packaging paper must have a strength of $S = 20$ lbs per square inch. The std. dev. for the strength of each piece is 2 lbs. To check the quality of the paper, a sample of 10 pieces is selected and the average strength $\bar{x}$ of the 10 pieces is calculated.

(a) Find the std. dev. of $\bar{x}$.

(b) If the strength $S$ of a piece averages 21 lbs/sq. inch, what is the probability that $\bar{x}$ is <20.

(c)(3) What should the average strength $S$ of a piece be in order for $P(\bar{x} < 20)$ to be .001? Note, $S$ must be >20. Hint, let $z_0$ be the z-score of 20. It involves $S$. First find $z_0$, then $S$. 

Score _____ / 20