Math 373 Hw 11 Name _____ Score _____/ 20

Hw 252: 7.16, 7.18, 7.22, 7.24. Rec 252: 7.25a, 7.27ab.

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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 $\bar{x}$.

$\mu_{\bar{x}}$ = _ . _ 8

SE = . _ _ 13

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 $\bar{x}$.

$\mu_{\bar{x}}$ = _ _ _ 7

$\sigma_{\bar{x}}$ = _ . _ 6

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

. _ _ _ 12

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

. _ _ 10

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 $\bar{x}$. Check 12, 16

mean = _ _ , _ _ _ std. dev. = _ _ _ . _ _

(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 ≤ 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 $\bar{x}$. . _ _ 9

Warning: in the calculations below, use the full std. dev., not the rounded answer above.

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

. _ _ _ 12

(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.

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