Stats HW 8

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Section 1A

9.2) a) These numbers are statistics since these numbers are calculated from a sample of 100 random full time students

b) $15.2 = \bar{x}$ $1.5 = s$

9.8) This is a sampling distribution of means as she takes samples and calculates the mean to graph in a histogram

9.10) a) sample mean = 60000 as it should be unbiased & essentially the same as the population mean.

b) Std Error is $\frac{\sigma}{\sqrt{n}} = \frac{\text{Std dev}}{\sqrt{n}} = \frac{30000}{\sqrt{400}} = 1500$

9.14) a) Since 400 observations & random sampling fulfill the Central Limit theorem requirements our graph's distribution of sample means follows an approximately normal distribution

b) Since our std error is 1500 $z = \frac{63000-60000}{1500} = 2$

c) Since probability that sample mean is less than 3000 away from mean of population is 95%, $1-0.95 = .05$ = probability that sample mean will be more than 3000 away from sample mean.

9.16) A = distribution of all used cars
B = Sample mean of 10 cars
C = Sample mean of 5 cars
D = Sample mean of 2 cars
This is due to the fact that Sampling distributions are normal (approximately) so we can rule A as the original distribution. Additionally, since std error decreases with more samples, we can know that B has the greatest samples, with C following with second most samples & D following with least samples

9.18) a) $\mu = 22.8$ $\sigma = 3.2$ $\bar{x} = 23.2$ $s = 2.4$

b) μ is a statistic

c) No, Conditions are not fulfilled since sample size < 25 & population distribution is not normal.

9.20)

$18546 \pm 1398 = 17148$

a) The answer should be : ;

population mean is between 17148 and 19944

b) No we cannot as the population mean of 18000 is within the 95% confidence interval

9.30) a) std error = $\frac{1.5}{\sqrt{100}} = 0.15$ $1.85 \pm 1.96(0.15) = \boxed{1.556, 2.144}$

b) $1.85 \pm 1.645(0.15) = \boxed{1.603, 2.096}$

c) The 95% confidence interval since it has the higher confidence level

9.34)

a) narrower due to lower confidence

b) wider as denominator in std error decreases

c) narrower as this decreases margin of error

9.42)

$h_0 = 25$

$h_a > 25$

Since the p-value given < 0.05, we can reject the null hypothesis, meaning there is evidence supporting the hypothesis (alternative) that the mean BMI is greater than 25.

9.44)

a) std error = $\frac{15}{\sqrt{40}} = 2.37$

$t = \frac{\bar{x} - \mu_0}{SE} = \frac{122 - 128}{2.37} = -2.53$

Based off the t value, the estimated p value is between .005 - 0.01 which is less than the significance level of .05, so we can reject the null hypothesis concluding that there is evidence that the mean weight for 20 year old vegetarian women is significantly less than 128

b) std error = $\frac{15}{\sqrt{100}} = 1.5$ $t = \frac{\bar{x} - \mu_0}{SE} = \frac{122-128}{1.5} = -4.$

Based off the t-table, the estimated p value is less than .001 meaning we can reject the null hypothesis & conclude there is evidence that the mean weight for 20 year old vegetarian women is significantly less than 128.

c) Difference in p-value is due to larger sample size in part b

9.5 2) It cannot be interpreted since there is no random sampling and that there is no population given that we are trying to interpret

9.54) a) These are independent since one observation doesn't affect the outcome of another observation

b) Independent since the samples are taken from two separate populations