Quiz 6

Name: _____

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1. What does the Central Limit Theorem state?

a) If sampling from a population that has $E(X)=\mu$ and $St\ Dev(X)=\sigma$, then $E(\bar{X})=\mu$ and $St\ Dev(\bar{X})=\sigma/\sqrt{(n)}$
b) If $X \sim N(\mu, \sigma)$, then $\bar{X} \sim N(\mu, \sigma/\sqrt{(n)})$
c) If sampling from a population that has true proportion p, then $E(\hat{p})=p$ and $St\ Dev(\hat{p})=\sqrt{(pq/n)}$
d) If X has a binomial distribution, then $E(X)=np$ and $St\ Dev(X)=\sqrt{(npq)}$
e) When sampling from a non-normal distribution, the distribution of the sample mean will be approximately normal if the sample size is large enough

2. We are interested in estimating the true proportion of Democrats in the state of California. We take a random sample of 120 Californians, and find that 48 of them are Democrats. Which of the following is the correct 95% confidence interval for the parameter of interest?

$\hat{p} = \frac{48}{120} = 0.4$ $\quad \hat{p} \pm z^* \sqrt{\frac{\hat{p}\hat{q}}{n}}$ $\quad 0.4 \pm 1.96\sqrt{\frac{(0.4)(0.6)}{120}}$

a) (0.36, 0.44)
b) (0.19, 0.61)
c) (-0.03, 0.83)
d) (0.31, 0.49)
e) (0.04, 0.76)

Use the following for questions 3 and 4

We are interested in the proportion of adults worldwide that drink green tea. We take a sample of 80 adults and find that 48 of them drink green tea. Assume that in reality 70% of adults worldwide drink green tea.

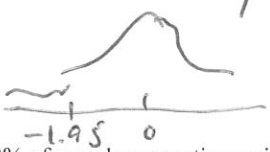
$\hat{p} = \frac{48}{80} = 0.6$

3. What is the probability of obtaining the sample proportion you did obtain, or lower?

$\hat{p} \sim N(p, \sqrt{\frac{pq}{n}})$ $\quad \hat{p} \sim N(0.7, \sqrt{\frac{0.7(0.3)}{80}})$

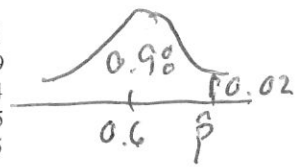
a) 0.08
b) 0.10
c) 0.97
d) 0.03
e) 0.60

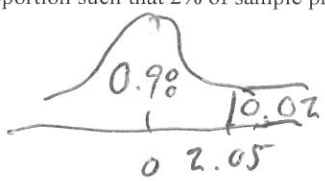
$z = \frac{0.6 - 0.7}{\sqrt{\frac{(0.7)(0.3)}{80}}} = -1.95$



4. What is the value of the sample proportion such that 2% of sample proportions will be above this value?

a) 0.81
b) 0.59
c) 0.34
d) 0.75
e) 0.65





$2.05 = \frac{\hat{p} - 0.7}{\sqrt{\frac{(0.7)(0.3)}{80}}}$

Use the following to answer questions 5 and 6

We are interested in whether the mean weight of female Hamadryas baboons is different than that of male Hamadryas baboons. It is known that the mean weight of male Hamadryas baboons is 25 kg. We take a random sample of female Hamadryas baboons, and from this sample calculate a sample mean of 12.5 and an associated 95% confidence interval of: (11.03, 13.97).

5. What would be the appropriate null and alternative hypotheses?

a) $H_o: \bar{X}=25 \quad H_a: \bar{X}=12.5$
b) $H_o: \mu=25 \quad H_a: \mu \neq 25$
c) $H_o: \bar{X}=25 \quad H_a: \bar{X} \neq 25$
d) $H_o: \mu=25 \quad H_a: \mu=12.5$
e) $H_o: \mu=25 \quad H_a: \mu<25$

6. Using the confidence interval obtained, what would be the result of the hypothesis test?

a) We would reject the null hypothesis, and conclude the mean weight of females is different than that of males
b) We would fail to reject the null hypothesis, and conclude the mean weight of females is different than that of males
c) We would reject the null hypothesis, and find there is not enough evidence to conclude the mean weight of females is different than that of males
d) We would fail to reject the null hypothesis, and find there is not enough evidence to conclude the mean weight of females is different than that of males
e) We would reject the null hypothesis, and conclude the mean weight of females is 12.5

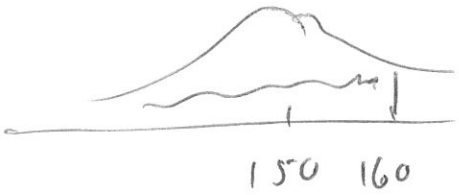
7. The weight of humans is normally distributed, with a mean weight of 150 lb, and standard deviation of 15 lb. If 2 humans step onto an elevator, what is the probability their average weight is 160 or less?

a) 0.75
b) 0.17
c) 0.67
d) 0.83
e) 0.25

$X \sim N(150, 15)$

$\bar{X} \sim N(150, 15/\sqrt{2})$

$\bar{X} \sim N(150, 10.61)$



$$z = \frac{160 - 150}{10.61}$$

$$= 0.94$$