

Test 9A

(1) a (2) b (3) c (4) d (5) d (6) e

(7) Although one might expect about half of the coin flips to come up tails for a fair coin, in 20 flips it is not at all unusual to observe 16 tails strictly due to chance. The next 20 flips could produce a \hat{p} value of 0.2. That these values can be quite different from one another is called *sampling variability*.

(8) If the coin is not *biased*, then the center of the sampling distribution should be 0.5. Since the center of the sampling distribution appears to be about .85, one can reasonably conclude that the true proportion of tails is about .85, i. e., the coin is not fair. (9) The mean is $\mu_{\hat{p}} = p = 0.40$. (10) The

standard deviation is $\sigma_{\hat{p}} = \sqrt{(0.4)(0.6)/1500} = 0.0126$. (11) There are more than $10(1500) = 15000$

adults in Ohio. (12) $np = 1500(0.4)$ and $n(1-p) = 1500(0.6)$ are both much larger than 10. (13)

$P(0.37 < \hat{p} < 0.43) = P((0.37 - 0.40)/0.0126 < z < (0.43 - 0.40)/0.0126) = P(-2.37 < z < 2.37)$

$= 0.9822$. (14) Solve $\sqrt{(0.4)(0.6)/n} \leq 0.01$: $(0.4)(0.6)/n \leq 0.01^2 \rightarrow n \geq (0.4)(0.6)/0.01^2 \rightarrow n \geq 2400$.

(15) $P(\bar{x} \leq 11.9) = P(Z \leq -1.77) = 0.0384$. (16) The distribution for \bar{x} will be approximately normal with mean $\mu(\bar{x}) = 12$ and standard deviation $\sigma(\bar{x}) = 0.0566$. (17) The central limit theorem.

(18) $12 \pm 2(0.4/\sqrt{25}) = 12 \pm .16$, which is the interval $(11.84, 12.16)$. (19) We can't find this probability because we have no information about the population from which the samples are taken. In particular, we can't use standard normal probabilities because we don't know if the population distribution is normal. And the central limit theorem doesn't apply because the sample size ($n = 1$) is too small.

Since we don't know what distribution the sample comes from, we can only

answer for sample means not for single cases.

This comes from a " \bar{x} " in which each sample has a size of 25.