99%

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Test #2

1. A z-score tells us exactly where a raw score is located in a distribution by telling us the number of standard deviations a raw score is from the mean, and whether the raw score is above or below the mean. For example, a z-score of +2.0 means that the score is two standard deviations above the mean.

2. Transforming raw scores into z-scores makes it possible to compare scores from different distributions because z locations are the same for all distributions. The mean and the standard deviation of the original distributions may be different, but z locations are not and a transformed distribution will have a mean of 0 and a standard deviation of 1.

3. Probability can be expressed in terms of proportions, or fractions. In other words, a proportion of ¾ is equivalent to a probability of 0.75 or 75%. This illustrates the relationship between probability and proportion. This relationship is also related to frequency distribution graphs because the graphs provide a visual depiction of the scores as a proportion of area in the frequency distribution.

4. The range of possible values for a proportion or probability is 0 (the event never or almost never occurs) up to 1 (the event occurs 100% of the time).

5. Binomial data are variables that exist in exactly one of two mutually exclusive categories. For example, male/female or pass/fail.

6. The Central Limit Theorem says a distribution of sample means appears as a normal distribution with mean = μ if the sample size n is relatively large or if the original population is a normal distribution. This theorem is important because it allows conclusions to be drawn about the distribution of sample means without having to obtain and plot every sample. It allows for inference.

7. A distribution of scores shows the location of individual raw scores. A sampling distribution is different because it's not a distribution of scores, but a distribution of statistics obtained from samples.

8. The standard deviation is a measure of the standard distance of a score from the population mean score. The standard error is a measure of the distance between a sample mean and the population mean.

9. The standard error is a measure of the distance between a sample mean and the population mean and it is related to sampling error because of the natural difference that tends to exist between the means for the sample and its population. Samples should be representative of their population, but they won't be exactly equal. A decrease in standard error reduces the sampling error; as sample size increases, the standard error decreases and so do the differences between the sample means and the population mean.

10. **The stats grade was furthest above the mean**
Stats Z = (X-M)/s = (78-55)/16^-2 = 5.75
Theatre Z = (X-M)/s = (98-90)/4 = 2.0

11a. .4452 - .1554 = **.2898**
11b. .4772 + .3413 = **.8185**
11c. **.0495**
11d. **+0.67, -0.67**

12. **X = 46.5**
60% corresponds to z= -0.25
X = μ + zσ
X = 48 + -0.25(6)
X = 46.5

13. **p = 0.2756**
expected value μ = 85
standard error = σ_m = σ/n^-2 = 20/6 = 3.33
z = M-μ/ σ_m = 86.2-85/3.33 = 0.3604
z = M-μ/ σ_m = 89.6-85/3.33 = 1.3814
p(86.2<M<89.6) = .3594 - .0838 = 0.2756

14a. $z = (X-\mu)/\sigma = (106-100)/10 =$ **+0.60**
$z = (X-\mu)/\sigma = (125-100)/10 =$ **+2.50**
$z = (X-\mu)/\sigma = (93-100)/10 =$ **-0.70**
$z = (X-\mu)/\sigma = (90-100)/10 =$ **-1.00**
$z = (X-\mu)/\sigma = (87-100)/10 =$ **-1.30**
$z = (X-\mu)/\sigma = (118-100)/10 =$ **+1.80**

14b. $X = \mu+z\sigma = 100+(1.20)(10) =$ **112**
$X = \mu+z\sigma = 100+(2.30)(10) =$ **123**
$X = \mu+z\sigma = 100+(-0.80)(10) =$ **92**
$X = \mu+z\sigma = 100+(0.40)(10) =$ **104**
$X = \mu+z\sigma = 100+(-3.00)(10) =$ **70**

15a. $z = (X-\mu)/\sigma = (55-50)/100\text{^-}2 = +0.50$, = **.6915 left, .3085 right**
15b. $z = (X-\mu)/\sigma = (50-50)/100\text{^-}2 = 0$, = **.5000 left, .5000 right**
15c. $z = (X-\mu)/\sigma = (48-50)/100\text{^-}2 = -0.20$, = **.4207 left, .5793 right**
15d. $z = (X-\mu)/\sigma = (40-50)/100\text{^-}2 = -1.00$, = **.1587 left, .8413 right**

16a. **p = .0606**
$pn = \mu = 0.50(50) = 25$
$qn = 0.50(50) = 25$
$\sigma = (npq)\text{^-}2 = [(.50)(.50)(50)]\text{^-}2 = 3.54$
$z = (X-pn)/(npq)\text{^-}2 = (30.5-25)/3.54 = +1.55 = .0606$

16b. **p = .0179**
$pn = \mu = 0.50(100) = 50$
$qn = 0.50(100) = 50$
$\sigma = (npq)\text{^-}2 = [(.50)(.50)(100)]\text{^-}2 = 5$
$z = (X-pn)/(npq)\text{^-}2 = (60.5-50)/5 = +2.10 = .0179$

(-1) 16c. These two probabilities are not identical because the means and the standard deviations differ.
Increased sample size = decreased standard error.

17a. **p = 0.3830**
$z = (X-\mu)/\sigma = (45-50)/10 = -0.5$.
$p = .1915 * 2 = 0.3830$

17b. **p = 0.9876**
expected value $\mu = 50$
standard error = $\sigma_m = \sigma/n\text{^-}2 = 10/5 = 2.0$
$z = M-\mu/\ \sigma_m = (45-50)/2 = -2.5$
$p = .4938 * 2 = 0.9876$

18a. **Larger than n = 4**
standard error = $\sigma_m = \sigma/n\text{^-}2$
$n = (\sigma/\ \sigma_m)^2 = (20/10)^2 = 4$

18b. **Larger than n = 16**
standard error = $\sigma_m = \sigma/n\text{^-}2$
$n = (\sigma/\ \sigma_m)^2 = (20/5)^2 = 16$

18c. **n = 400**
standard error = $\sigma_m = \sigma/n\text{^-}2$
$n = (\sigma/\ \sigma_m)^2 = (20/1)^2 = 400$

19a. **p = 0.5934**
expected value $\mu = 75$
standard error = $\sigma_m = \sigma/n\text{^-}2 = 12/2 = 6.0$
$z = M-\mu/\ \sigma_m = (70-75)/6 = -0.83$
$p = .2967 * 2 = 0.5934$

19b. **$p = .9050$**

expected value $\mu = 75$

standard error = $\sigma_m = \sigma/n$^-2 = 12/4 = 3.0

$z = M - \mu / \sigma_m = (70-75)/3 = -1.67$

$p = .4525 * 2 = 0.9050$