Final/AP Exam - **Review Game 1**

**Round 1 - DO NOT WRITE ON THIS PAPER.**

1) A piece of clothing takes an average of 38 minutes to move through an assembly line. If the standard deviation is 4 minutes, and the distribution is normal, what is the probability that a piece of clothing will take over 45 minutes?

**a) 0.04**
b) 0.80
c) 0.175
d) 0.227
e) 0.460

2) A survey is to be taken to estimate the proportion of voters who favor stem cell research. Among the following proposed sample sizes, which is the smallest that will still guarantee a margin of error of at most .035 for a 96 percent confidence interval?

a) 30
b) 784
c) 841
**d) 900**
e) 961

3) For which of the following is a binomial an appropriate model?

**a) The number of heads in ten tosses of an unfair coin weighted so that heads comes up twice as often as tails.**
b) The number of hits in five at-bats where the probability of a hit is either .352 or .324 depending upon whether the pitcher is right-handed or left-handed.
c) The number of tosses of a fair coin before heads appears on two consecutive tosses.
d) The number of snowy days in a given week.
e) The binomial is appropriate in all of the above.

4) If the standard deviation of a set of observations is 0, what can you conclude.

a) that there is no relationship between the observations
b) that the average value is 0
**c) that all observations are the same value**
d) that a mistake in arithmetic has been made
e) none of the above

5) A researcher believes that a new diet should improve weight gain in laboratory mice. If the average gain for 12 mice on the new diet is 5.3 ounces with a standard deviation of 0.5 ounces, while 15 control mice on the old diet gain an average of 5 ounces with a standard deviation of 0.4 ounces, what is the *p*-value?

a) Below .01
b) Between .01 and .025
c) Between .025 and .05
**d) Between .05 and .10**
e) Over .10

6) Two antidepressants are to be compared in the treatment of elderly patients in a nursing home. Each patient has his or her own room, some with spectacular views of the ocean. The experimental design is to create homogeneous blocks with respect to the window view. How should randomization be used for a *randomized block design*?

**a) Within each block, randomly pick half the patients to receive each antidepressant.**
b) Randomly pick half of all patients to receive each antidepressant, but then analyze the results separately by blocks.
c) Randomly choose which blocks will receive which antidepressant.
d) Randomly choose half the blocks to receive each antidepressant for a given time period; then for the same time period switch the medication in each block and compare the results.
e) For ethical reasons, allow patients to choose which medication they prefer taking, but then randomly assign patients to the blocks.

**Round 2 - DO NOT WRITE ON THIS PAPER.**

7) Which of the following statements are true?

I Two students working with the same set of data may come up with histograms that look different.
II Displaying outliers is less problematic when using histograms than when using stemplots.
III Histograms are more widely used than stemplots or dotplots because histograms display the values of individual observations.

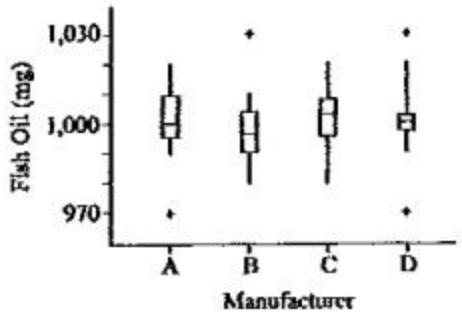
**a) I only**
b) II only
c) III only
d) I and II
e) II and III

8) Which of the following are true statements?

I Voluntary response samples often underrepresent people with strong opinions.
II Convenience samples often lead to undercoverage bias.
III Questionnaires with nonneutral wording are likely to have response bias.

a) I and II
b) I and III
**c) II and III**
d) I, II, and III
e) None of the above gives the complete set of true responses.

9) The amount of Omega 3 fish oil in capsules labeled 1,000 mg is measured for four manufacturers' products yielding the following:




Which of the manufacturers' samples has the smallest range?

a) A
b) B
**c) C**
d) D
e) There is insufficient information to answer this question.

10) Suppose 56 percent of eight to twelve year olds expect to have “a great life.” In an SRS of 125 eight to twelve year olds, what is the probability that between 50 percent and 60 percent will say they expect to have “a great life”?

a) .2721
b) .5402
c) .6723
**d) .7279**
e) .8640

11) To find out a town’s average family size, a researcher interviews a random sample of parents arriving at a pediatrician’s office. The average family size in the final 100-family sample is 3.48. Is this estimate probably too low or too high?

a) Too low because of undercoverage bias.
b) Too low because convenience samples underestimate average results.
**c) Too high because of undercoverage bias.**
d) Too high because convenience samples overestimate average results.
e) Too high because voluntary response samples overestimate average results.

12) Should there be more restrictions on handguns? In a 1995 pre-Columbine survey, 255 out of 1,020 adults answered in the affirmative; in a 2000 post-Columbine survey, 352 out of 1,100 answered affirmatively. Establish a 90 percent confidence interval estimate of the difference between the proportions of adults in 1995 and 2000 who support more restrictions on handguns.

$a)\ (.25 - .32) \pm 1.645\sqrt{\frac{(.25)(.75)}{1{,}020} + \frac{(.32)(.68)}{1{,}100}}$

$b)\ (.25 - .32) \pm 1.645\left(\frac{(.25)(.75)}{\sqrt{1{,}020}} + \frac{(.32)(.68)}{\sqrt{1{,}100}}\right)$

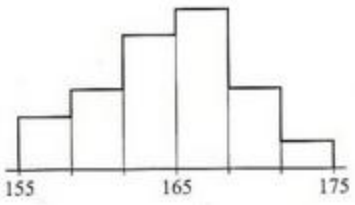
$c)\ (.25 - .32) \pm 1.96\sqrt{\frac{(.25)(.75)}{1{,}020} + \frac{(.32)(.68)}{1{,}100}}$

$d)\ (.25 - .32) \pm 1.96\left(\frac{(.25)(.75)}{\sqrt{1{,}020}} + \frac{(.32)(.68)}{\sqrt{1{,}100}}\right)$

$e)\ (.25 - .32) \pm 2.576\left(\frac{\sqrt{(.25)(.75)}}{1{,}020} + \frac{\sqrt{(.32)(.68)}}{1{,}100}\right)$

**Round 3 - DO NOT WRITE ON THIS PAPER.**

13) In a random sample of 20 cups of coffee, the temperature (°F) per cup is noted and a histogram and summary statistics are as follows:




$n = 20,\ \bar{x} = 164.75,\ s = 5.02$

A medical group suggests that anything over 167°F is too hot.

a) Is 167°F in the 95 percent confidence interval for the mean coffee temperature?

b) Is there evidence at the 5 percent significance level that the mean temperature is less than 167°F?

**ANSWERS**

1) A
2) D
3) A
4) C
5) D
6) A

7) A
8) C
9) C
10) D
11) C
12) A

13)

a) **Name(.5):** Confidence interval for a mean (t)
**Conditions (.5):** Random, Pop is 10x Larger 20(10)=200, Approx Normal (Histogram)
**Values (.5):** $df$ = 19
**Interval (.5):** (162.40, 167.10)
**Context (1):** Yes, 167°F is in the 95% confidence interval.

b) **Name (.5):** Hypothesis test for a mean (t) (conditions were already met above)
**Null and Alt Hyp (.5):** $H_0$: $\mu$ = 167 and $H_a$: $\mu$ < 167
**Values(.5):** $t$ = -2.0044, $p$-value = .0297
**P-value compared to alpha w/ conclusion (.5):** .0297 < .05 Reject $H_0$
**Context (1):** There is enough significant data to say the mean temperature is less than 167°F.