STAT 110 – Fall 2009 – Section 4 – Exam 3 **FORM A**

Answer each of the twenty-five questions below on the scantron sheet using a number two-pencil.
Be sure to bubble in your STAT110 ID (as passed around)
Mark which form you are using. You may use a non-programmable calculator.

FAILURE TO BUBBLE IN YOUR ID is a ONE QUESTION PENALTY ON THE EXAM.

1) The University parking services is trying to gauge the support for raising the parking costs in order to install new security cameras. They take a survey of a random sample of 300 of those currently renting spots. 146 of those favor the increased fees for parking, while 154 are against raising the fees. What is the observed proportion ($\hat{p}$) who favor increasing the fees?

A) $\sqrt{\frac{0.948(1-0.948)}{154}} \approx 0.017 = 1.7\%$

B) $\sqrt{\frac{0.487(1-0.487)}{300}} \approx 0.029 = 2.9\%$

C) $146/300 \approx 0.487 = 48.7\%$

D) $154/300 \approx 0.513 = 51.3\%$

E) $146/154 \approx 0.948 = 94.8\%$

2) Continuing the previous problem, assuming the true percentage favoring increase is 45%, what is the standard deviation of the sampling distribution of the observed proportion?

A) $\sqrt{\frac{0.948(1-0.948)}{154}} \approx 0.017 = 1.7\%$

B) $\sqrt{\frac{0.45(1-0.45)}{300}} \approx 0.029 = 2.9\%$

C) $\sqrt{\frac{0.487(1-0.487)}{300}} \approx 0.029 = 2.9\%$

D) $\sqrt{\frac{0.513(1-0.513)}{300}} \approx 0.029 = 2.9\%$

E) $\sqrt{\frac{0.45(1-0.45)}{154}} \approx 0.040 = 4.0\%$

3) If $\hat{p}$ has an expected value (mean) of 52% and a standard deviation of 6%. What percent of the time will $\hat{p}$ fall between 46% and 52%?

A) 16%
B) 32%
C) 34%
D) 68%
E) 95%

4) If $\hat{p}$ has an expected value (mean) of 52% and a standard deviation of 6%. What percent of the time will $\hat{p}$ fall below 40%?

A) 0.15%
B) 0.3%
C) 2.5%
D) 5%
E) 95%

5) A game with two possible prizes gives you a 0.028 (2.8%) chance of winning $25.00 and a 0.047 (4.7%) chance of winning $10.00. What is the chance that you win nothing?

A) 0.075 = 7.5%
B) 0.925 = 92.5%
C) 0.953 = 95.3%
D) 0.972 = 97.2%
E) 0.999 = 99.9%

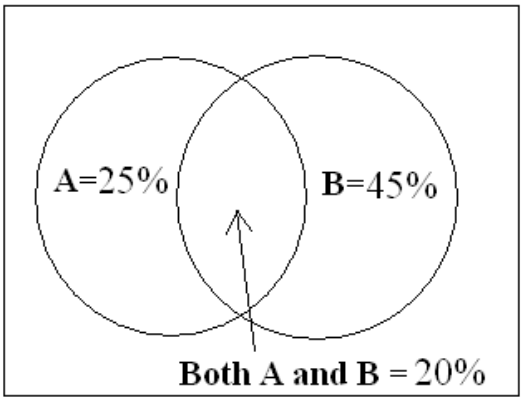
6) A game with two possible prizes gives you a 0.028 (2.8%) chance of winning $25.00 and a 0.047 (4.7%) chance of winning $10.00. How much is playing the game once worth?

A) $0.30
B) $0.47
C) $0.70
D) $1.17
E) $3.00

7) The odds for a team to win their next game are of 7 to 2 against them winning. This means their estimated probability of it winning is:

A) 1/9 ≈ 11.1%
B) 1/7 ≈ 14.3%
C) 2/7 ≈ 28.6%
D) 2/9 ≈ 22.2%
E) 5/9 ≈ 55.6%

Questions 8-10 refer to the Venn diagram at the right, where A occurs with probability 0.25, B occurs with probability 0.45, and both A and B occur with probability 0.20.



8) What is the probability of either event A or event B (or both) happening?

A) 10%
B) 30%
C) 50%
D) 70%
E) 90%

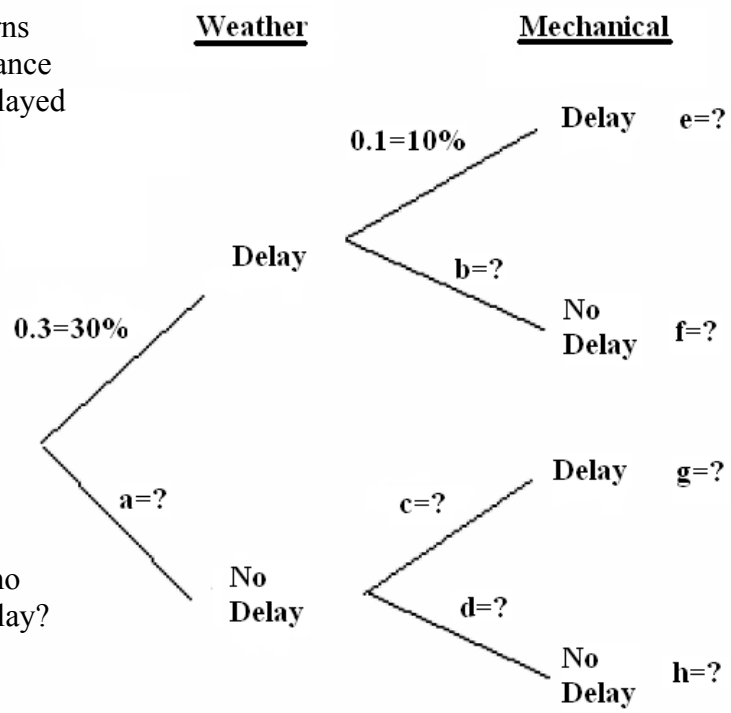
9) What is the probability of exactly one of event A or event B (but not both) happening?

A) 10%
B) 30%
C) 50%
D) 70%
E) 90%

10) What is the probability of event A happening but not event B happening?

A) 5%
B) 9%
C) 20%
D) 25%
E) 50%

Questions 11-15: The following tree diagram concerns whether or not a flight is on time. The has a 30% chance of being delayed due to weather. If the flight was delayed due to weather, there is a 10% chance it also has a mechanical delay.



11) What is the chance that there is no delay due to weather?

A) 30%
B) 40%
C) 60%
D) 70%
E) 90%

12) Which missing value is the chance that there is no mechanical delay given that there was no weather delay?

A) b
B) c
C) d
D) f
E) h

13) What is the chance that there is both a delay due to weather and a delay due to mechanical difficulties?

A) 1%
B) 3%
C) 40%
D) 70%
E) 90%

14) The probability that there is at least one delay is:

A) e
B) e+f
C) e+f+g
D) e+g
E) g

15) If mechanical delays and weather delays are independent then:

A) c=0.05
B) c=0.10
C) c=0.30
D) c=0.60
E) c=0.90

16) Used cars traded in at a dealership have a 30% chance of needing their breaks replaced, 20% chance of needing body work, a 20% chance of needing a new transmission; 15% need both breaks and body work, 12% need both body work and a new transmission, 10% need both breaks and a new transmission; and, 5% need all three. This problem is easiest to set up and analyze using:

A) A tree diagram that branches twice
B) A tree diagram that branches three times
C) A Venn diagram with two circles that overlap
D) A Venn diagram with two circles that do not overlap
E) A Venn diagram with three circles

17) Of students attending college in South Carolina 30% are enrolled at USC and 20% are enrolled at Clemson (no students are attending both). This problem is easiest to set up and analyze using:

A) A tree diagram that branches twice
B) A tree diagram that branches three times
C) A Venn diagram with two circles that overlap
D) A Venn diagram with two circles that do not overlap
E) A Venn diagram with three circles

Questions 18-20: A test-prep company is trying to find evidence to back up its claim that its program will help increase GRE scores by an average of over 30 points.

18) What null hypothesis is the company testing?

A) H_0: average increase < 30 points
B) H_0: average increase = 30 points
C) H_0: average increase ≠ 30 points
D) H_0: average increase > 30 points

19) What should their alternate hypothesis be?

A) H_A: average increase < 30 points
B) H_A: average increase = 30 points
C) H_A: average increase ≠ 30 points
D) H_A: average increase > 30 points

20) If the testing company wants to use α=0.05 and their p-value is 0.08, then:

A) They do not have enough evidence to reject H_0, and so they can claim the improvement over 30 points
B) They do not have enough evidence to reject H_0, and so they cannot claim the improvement over 30 points
C) They reject H_0, and so they can claim the improvement is over 30 points
D) They reject H_0, and so they cannot claim the improvement is over 30 points

21) α is:

A) The probability you are willing to reject H_0 when H_0 is really false
B) The probability you are willing to reject H_0 when H_0 is really true
C) The probability you are willing to reject H_A when H_A is really false
D) The probability you are willing to reject H_A when H_A is really true

22) A p-value of 0.048 means that

A) There is a 4.8% chance of not rejecting H_0 when it is false.
B) There is a 4.8% chance of not rejecting H_0 when it is true
C) There is a 4.8% chance of rejecting H_0 when it is really true.
D) There is only a 4.8% chance of observing this much evidence against H_0 when it is really true.
E) There is only a 4.8% chance of observing this much evidence in favor of H_0 when it is really true.

Questions 23-25: A politician is seeking evidence that less than 50% of their constituents favor a proposed amendment.

23) What null hypothesis is politician testing?

A) H_0: percent favoring < 50%
B) H_0: percent favoring = 50%
C) H_0: percent favoring ≠ 50%
D) H_0: percent favoring > 50%

24) What should their alternate hypothesis be?

A) H_A: percent favoring < 50%
B) H_A: percent favoring = 50%
C) H_A: percent favoring ≠ 50%
D) H_A: percent favoring > 50%

25) If the politician is using α=0.05 and their p-value is 0.032, then:

A) They do not have enough evidence to reject H_0, and they do not have evidence the support is less than 50%
B) They do not have enough evidence to reject H_0, and they have evidence the support is less than 50%
C) They reject H_0, and so they do not have evidence the support is less than 50%
D) They reject H_0, and so they have evidence the support is less than 50%