STAT 110 – Fall 2009 – Practice Exam 3 Solutions

1) A politician is taking a survey of 500 likely voters to see if a majority (at least 50%) of their constituents favor increasing the cigarette tax. The particular sample of 500 they collected had 252 favoring an increase in the cigarette tax. What is the observed proportion ($\hat{p}$) who favor increasing the tax?

E) 252/500 = 0.504 = 50.4%

2) Continuing the previous problem, assuming the true percentage favoring increase is 50%, what is the standard deviation of the sampling distribution of the observed proportion?

A) $\sqrt{\frac{0.5(1-0.5)}{500}} \approx 0.022 = 2.2\%$

3) If $\hat{p}$ has an expected value (mean) of 43% and a standard deviation of 2%. What percent of the time will $\hat{p}$ fall between 41% and 45%?

D) 68%

4) If $\hat{p}$ has an expected value (mean) of 43% and a standard deviation of 2%. What percent of the time will $\hat{p}$ fall above 47%?

C) 2.5%

5) A raffle with 1,000 tickets has 1 grand prize worth $20,000, and 10 second prizes each worth $1,000.
What is the chance of not winning any prize if you buy one of the tickets?

C) 0.989 = 98.9%

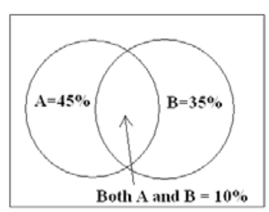
6) A raffle with 1,000 tickets has 1 grand prize worth $20,000, and 10 second prizes each worth $1,000.
How much is a ticket "worth"?

E) $30.00

7) The Pittsburgh Steelers are given odds of 7 to 1 against them winning the Super-Bowl this year. This means their estimated probability of it winning is:

A) 1/8 = 12.5%

<u>Questions 8-10</u> refer to the Venn diagram at the right.



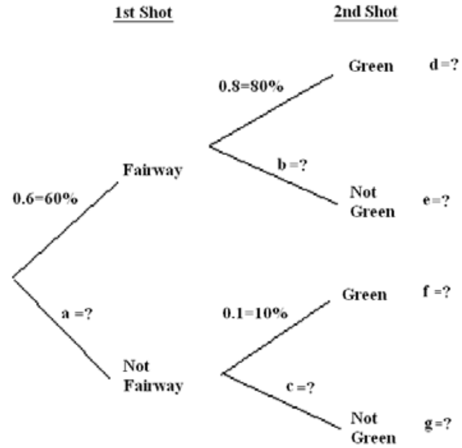
8) What is the probability of either event A or event B (or both) happening?
C) 70%

9) What is the probability of neither event A nor event B happening?

B) 30%

10) What is the probability of event A happening but not event B happening?
C) 35%

Questions 11-15: The following tree diagram concerns a golfers first two shots. On the first shot, they either land in the fairway, or they don't. On the second shot, they either land on the green, or they don't.



11) What is the chance the first shot does not land on the fairway?

D) 40%

12) Which missing value is the chance that the second shot does not land on the green given that the first shot did land on the fairway?

B) b

13) What is the chance the first shot lands on the fairway and the second shot lands on the green?

B) 48%

14) The probability the second shot lands on the green would be:

D) d+f

15) The first shot landing on the fairway and the second shot landing on the green:

C) Neither of the above

16) Consider taking three free-throw shots in a row. The chance of the first shot going in is 60%. The chance of making the second or third shot is 80% if you made the one before it, but only 50% if you missed the one before it. You are interested in finding the probabilities of making exactly one shot, exactly two shots, and exactly three shots out of three. This problem is easiest to set up and answer using:

B) A tree diagram that branches three times

17) Consider a malfunctioning toaster. There is a 20% chance that it will burn the toast, a 40% chance it doesn't pop the toast up, and a 15% chance it both burns the toast and doesn't pop it up. This problem is easiest to set up and answer using:

C) A Venn diagram with two circles that overlap

Questions 18-20: A chemical company needs to show that its average emissions are less than the danger threshold of 20 ppm (parts per million) before they can open their plant for regular production.

18) What null hypothesis is the company testing?

B) H_0: average emissions = 20 ppm

19) What should their alternate hypothesis be?

A) H_A: average emissions < 20 ppm

20) If the chemical company needs to use α=0.05 and their p-value is 0.021, then:

C) They reject H_0, and so they can go into regular production

21) If rejecting H_0 when it's actually true is very dangerous, then:

A) You want to choose a very small α-level (like 0.001 = 0.1%).

22) A p-value of 0.021 means that

D) There is only a 2.1% chance of observing this much evidence against H_0 when it is really true.

Questions 23-25: A company claims that at least 90% of its (very complicated) products perform correctly. A consumer protection organization testing thinks the companies claim is dishonest.

23) What null hypothesis is the consumer protection organization testing?

B) H_0: percent working = 90%

24) What should their alternate hypothesis be?

A) H_A: percent working < 90%

25) If the consumer protection organization needs to use α=0.01 and their p-value is 0.032, then:

A) They do not have enough evidence to reject H_0, and so they do not have evidence the company is untruthful