Math 153 - Quiz 5

October 2, 2014

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) During the last flu season, a number of adults participated in a double-blind study of the effectiveness of a new flu vaccine. The following data were collected.

	Caught the flu	Did not catch the flu
Took vaccine	37	259
Took placebo	97	232

259
232
37
+ 97
625

A person from this study is selected at random.

(a) What is the probability that the person caught the flu?

$$\frac{37+97}{625} = \frac{134}{625} = 21.44\%$$

(b) What is the probability that the person took the placebo?

$$\frac{97+232}{625} = \frac{329}{625} = 52.64\%$$

(c) What is the probability that the person took the vaccine and caught the flu?

$$\frac{37}{625} = 5.92\%$$

(d) What is the probability that the person did not take the placebo?

$$1 - \frac{329}{625} = \frac{296}{625} = 47.36\%$$

(e) What is the probability that the person took the vaccine or caught the flu?

$$\frac{37+259+97}{625} = \frac{393}{625} = 62.88\%$$

(f) What is the probability that the person took the placebo and caught the flu?

$$\frac{97}{625} = 15.52\%$$

2. (3 points) Suppose A and B are events such that $P(A) = 0.35$, $P(\overline{B}) = 0.45$, and $P(A \cup B) = 0.69$.

(a) Determine $P(A \cap B)$.

$P(B) = 0.55$

$= P(A) + P(B) - P(A \cup B)$

$= 0.35 + 0.55 - 0.69 = \boxed{0.21}$

(b) What are the odds in favor of $A \cup B$?

$$\frac{P(A \cup B)}{P(\overline{A \cup B})} = \frac{0.69}{1 - 0.69} = \frac{0.69}{0.31} = \boxed{\frac{69}{31}}$$

(c) What are the odds in favor of B?

$$\frac{P(B)}{P(\overline{B})} = \frac{0.55}{0.45} = \frac{55}{45} = \boxed{\frac{11}{9}}$$

3. (2 points) If the odds in favor of the event Z are $7 : 18$, what is the probability of $\overline{Z}$?

$$\frac{\text{FAVORABLE}}{\text{UNFAVORABLE}} = \frac{7}{18} \Rightarrow \frac{\text{FAVORABLE}}{\text{TOTAL}} = \frac{7}{7+18} = \frac{7}{25} = \text{PROB OF } Z$$

$$\Rightarrow \boxed{\text{PROB OF } \overline{Z} = \frac{18}{25}}$$

4. (2 points) A letter is selected at random from the word *EYJAFJALLAJOKULL*. What is the sample space for this experiment? Is your sample space a uniform sample space?

SAMPLE SPACE = $\{E, Y, J, A, F, L, O, K, U\}$

NOT UNIFORM SINCE OUTCOMES ARE NOT EQUALLY LIKELY.