Stat 2470, Quiz #2, Spring 2015 Name KEY

Instructions: Show all work. State any formulas used. If you use the calculator, you should say which function you used, and what you entered into it, as well as any output. I can only give partial correct for incorrect answers if I have something to grade.

1. Consider the universal set to be $\{0, 1, 2, \dots, 10, 11, 12\}$. Let $A = \{2, 5, 8, 11\}$ and $B = \{1, 3, 7, 12\}$, and $C = \{0, 2, 6, 9, 10\}$. Find the following sets.
   a. $A \cup B$

      $\{1, 2, 3, 5, 7, 8, 11, 12\}$

   b. $A' \cap C$ $A' = \{0, 1, 3, 4, 6, 7, 9, 10, 12\}$

      $A' \cap C = \{0, 6, 9, 10\}$

   c. $(B' \cap C') \cup A$ $B' = \{0, 2, 4, 5, 6, 8, 9, 10, 11\}$ $C' = \{1, 3, 4, 5, 7, 8, 11, 12\}$

      $B' \cap C' = \{4, 5, 8, 11\}$

      $(B' \cap C') \cup A = \{2, 4, 5, 8, 11\}$

2. Consider the following set of survey results.

	Age <18	18<Age<45	Age>45	
Has a landline	5	23	78	106
Does not have a landline	85	45	23	153
	90	68	101	259

   a. If we choose a person at random from those in the survey, what is the probability the person will have a landline?

      $\frac{106}{259} \approx 40.93\%$

   b. What is the probability they are between the ages of 18 and 45, and don't have a landline?

      $\frac{45}{259} \approx 17.37\%$

   c. What is the probability that they are not between the ages of 18 and 45 or do not have a landline?

      $\frac{90+101}{259} + \frac{153}{259} - \frac{\cancel{85}+23}{259} \approx 91.1\%$

d. What is the probability of being over 45 given that they don't have a landline?

$\frac{23}{153} \approx 15.03\%$

3. How many ways are there to flip a coin ten times and get 6 heads?

$\binom{10}{6} = 210$

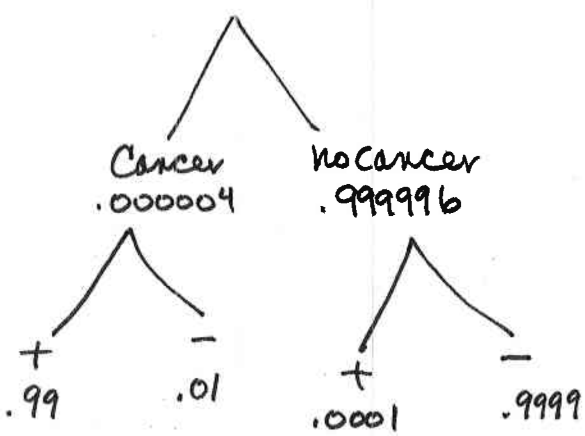
4. How many ways are there to select officers for club of 15 people if they need to select President, Vice President and Treasurer?

$_{15}P_3 = 2730$

5. If someone has 7 shirts, 4 pairs of pant, three pairs of shoes, and 2 jackets, how many different outfits can they create?

$7 \cdot 4 \cdot 3 \cdot 2 = 168$

6. If a certain blood test can detect a specific type of brain cancer 99% of the time when it is present, and correctly detects no cancer 99.99% of the time, but the rate of this type of cancer in the population is only 0.0004% of the population, what is the probability of having cancer given that you have received a positive test result?



positive test =

$(.000004)(.99) + (.999996)(.0001) =$

1.039596×10^{-4}

$$\frac{(.000004)(.99)}{1.039596 \times 10^{-4}} = .0380917202$$

$\boxed{3.8\%}$