STA 032 Homework 2

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Winter 2015

§ 2.1 3 (1) The possible outcomes are:

Q1	Q2	Q3	Q4
T	T	T	T
T	T	T	F
T	T	F	T
T	T	F	F
T	F	T	T
T	F	T	F
T	F	F	T
T	F	F	F
F	T	T	T
F	T	T	F
F	T	F	T
F	T	F	F
F	F	T	T
F	F	T	F
F	F	F	T
F	F	F	F

(2) The answers are all the same only twice. Once when the answers are all True, and once when the answers are all False.
So the probability of this event is $\frac{2}{16} = \frac{1}{8} = 0.125 = 12.5\%$

(3) Exactly one answer is True occurs four times.
So the probability of this event is $\frac{4}{16} = \frac{1}{4} = 0.25 = 25\%$

(4) At most one answer is True occurs five times.
So the probability of this event is $\frac{5}{16} = 0.3125 = 31.25\%$

5 (1) The possible outcomes are: $\{1, 2, 31, 32, 41, 42, 341, 342, 431, 432\}$

(2) If we interview exactly one candidate $A = \{1, 2\}$

(3) If we interview exactly three candidates $B = \{341, 342, 431, 432\}$

(4) If we interview candidate 3 $C = \{31, 32, 341, 342, 431, 432\}$

(5) If we do not interview candidate 2 $D = \{1, 31, 41, 341, 431\}$

(6) If we interview candidate 4 $E = \{41, 42, 341, 342, 431, 432\}$.
A and E are mutually exclusive as $A \cap E = \{\}$
B and E are not mutually exclusive as $B \cap E = \{341, 342, 431, 432\}$
C and E are not mutually exclusive as $C \cap E = \{341, 342, 431, 432\}$
D and E are not mutually exclusive as $D \cap E = \{41, 341, 431\}$

6 (1) The equally likely outcomes are $\{\{1,2\},\{1,3\},\{1,4\},\{2,3\},\{2,4\},\{3,4\}\}$

(2) There are six equally likely outcomes. Candidate 1 and candidate 2 have to be in the same outcome. This only occurs once.
So the probability that both candidates are qualified is $\frac{1}{6} = 0.1\overline{6} = 16.\overline{6}\%$

(3) There are six equally likely outcomes. One of (but not both) candidate 1 and candidate 2 have to be in the outcome This occurs four times.
So the probability that exactly one candidate is qualified is $\frac{4}{6} = 0.\overline{6} = 66.\overline{6}\%$

15 We have our probabilities.
$P(R) = 0.85, P(M) = 0.78, P(R \cap M) = 0.65$
These imply
$P(R^C) = 0.15, P(M^C) = 0.22, P(R \cup M) = P(R) + P(M) - P(R \cap M) = 0.98$

(1) We want to find $P(M \cap R^C)$

$$P(M \cap R^C) = P(M) - P(M \cap R) = 0.78 - 0.65 = 0.13$$

So the probability that a student is proficient in mathematics but not reading is 13%.

(2) We want to find $P(R \cap M^C)$

$$P(R \cap M^C) = P(R) - P(R \cap M) = 0.85 - 0.65 = 0.2$$

So the probability that a student is proficient in reading but not mathematics is 20%.

(3) We want to find $P((R \cup M)^C)$

$$P((R \cup M)^C) = 1 - P(R \cup M) = 1 - 0.98 = 0.02$$

So the probability that a student is proficient in neither reading nor mathematics is 2%.

§ 2.2 6

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§ 2.3 10 (1)

(2)

(3)

(4)

(5)

17 (1)

(2)

(3)

(4)

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