AM 165

Homework #1

Chapter 2: 2, 6, 9, 14, 21, 25, 46, 50

(2) Suppose A and B are events...

a) Both events occur: $A \cap B$

b) At least one event occurs $A \cup B$

c) Neither occurs $(\overline{A \cup B})$ or $\bar{A} \cap \bar{B}$

d) Exactly one occurs $(A \cap B^c) \cup (A^c \cap B)$

or $A \setminus B \cup B \setminus A$ $\quad (\overline{A \cap B}) \cap (A \cup B)$

or $A \Delta B$

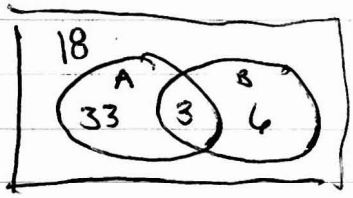
↑ symmetric difference

(6) 60 students 9 Living off Campus, 36 undergrad

3 undergrads Living off Campus

A: undergrads

B: Live off Campus



a) * $A \cup B = 42$

b) * $B \cap A^c = 33$

c) * $A^c \cap B^c = 18$

(9) $\Omega = \{E_1\ E_2\ E_3\ E_4\ E_5\}$

a) $P(E_1) = P(E_2) = .15 \quad P(E_3) = .4 \quad P(E_4) = 2P(E_5)$

$\sum P(E_i) = 1$

$\Rightarrow .7 + 3P(E_5) = 1$

$\Rightarrow P(E_5) = .1 \quad P(E_4) = .2$

b) $P(E_1) = 3P(E_2) = .3$ Rest equiprobable

$\Rightarrow P(E_3) = P(E_4) = P(E_5) = .2$

(14) Volunteers in Blood Center $\frac{1}{3}$ O^+ $\frac{1}{15}$ O^- $\frac{1}{3}$ A^+ $\frac{1}{16}$ A^-

a) $P(O^+) = \frac{1}{3}$

b) $P(O) = P(O^+) + P(O^-) = \frac{2}{5}$

c) $P(A) = P(A^+) + P(A^-) = \frac{19}{48}$

d) $P(\text{Neither A nor O}) = 1 - P(O) - P(A) = 1 - \frac{2}{5} - \frac{19}{48} = \frac{49}{240}$

$\approx .204$

(21) Two Jurors needed, 4 men 2 women to choose from

a) The experiment randomly selects two applicants out of 6 (4 men, 2 women)
Denote the selection of 1 Male and 1 Female Juror as {M, F}
order of selection is unimportant

b) $\Omega = \{ \{MM\}, \{MF\}, \{FF\} \}$

c) $P(\{FF\}) = \frac{1}{15}$ Note: $P(\{FF\}) = \frac{\binom{4}{0}\binom{2}{2}}{\binom{6}{2}} = \frac{1 \cdot 1}{15}$

(25) Median Family Income $35,353. 4 families surveyed

a) $\Omega = \{ 0, 1, 2, 3, 4 \}$ (The # of families whose income exceeded the Media

b) i) At least two had incomes exceeding median → $\{2\}\{3\}\{4\} = A$

ii) Exactly 2 → $\{2\} = B$

iii) Exactly 1 had income less than median ($\Rightarrow$ 3 had income > median) $\Rightarrow \{3\}$ C_{11}

c) Assign Probabilities to the simple events

(Note: $P(\text{Less than median}) = \frac{1}{2}$)

Event:	0	1	2	3	4
Probability:	1/16	1/4	3/8	1/4	1/16

$P(A) = 11/16 = \frac{1}{16} + \frac{4}{16} + \frac{6}{16} =$

$P(B) = 3/8$

$P(C) = 1/4$

(46) Study 10 problems, solve 6, 5 on Exam (Random)

$P(\text{Student can solve all 5 exam Questions}) = \frac{\binom{6}{5}\binom{4}{0}}{\binom{10}{5}} = \frac{6 \cdot 1}{252}$

$\boxed{\frac{1}{42}}$

.0238

(50) Balanced die tossed 6 times

$P(1,2,3,4,5,6 \text{ in any order}) = \frac{\#\text{ "good" outcomes}}{\text{total \# outcomes}} = \frac{6!}{6^6} = \frac{5}{324}$

$= .0154$