Stat 302 Winter 07/08 – Solutions to Suggested Problems: Chapter 2

5. (a) $2^5 = 32$

(b)

$W = \{(1, 1, 1, 1, 1), (1, 1, 1, 1, 0), (1, 1, 1, 0, 1), (1, 1, 0, 1, 1), (1, 1, 1, 0, 0), (1, 1, 0, 1, 0)$
$(1, 1, 0, 0, 1), (1, 1, 0, 0, 0), (1, 0, 1, 1, 1), (0, 1, 1, 1, 1), (1, 0, 1, 1, 0), (0, 1, 1, 1, 0), (0, 0, 1, 1, 1)$
$(0, 0, 1, 1, 0), (1, 0, 1, 0, 1)\}$

(c) 8

(d) $AW = \{(1, 1, 1, 0, 0), (1, 1, 0, 0, 0)\}$

6. (a) $S = \{(1, g), (0, g), (1, f), (0, f), (1, s), (0, s)\}$

(b) $A = \{(1, s), (0, s)\}$

(c) $B = \{(0, g), (0, f), (0, s)\}$

(d) $\{(1, s), (0, s), (1, g), (1, f)\}$

10. Let R and N denote the events, respectively, that the student wears a ring and wears a necklace.

(a) $P(R \cup N) = 1 - .6 = .4$

(b) $.4 = P(R \cup N) = P(R) + P(N) - P(RN) = .2 + .3 - P(RN)$
Thus, $P(RN) = .1$

14. $P(M) + P(W) + P(G) - P(MW) - P(MG) - P(WG) + P(MWG) = .312 + .470 + .525 - .086 - .042 - .147 + .025 = 1.057$

18. $\dfrac{2 \cdot 4 \cdot 16}{52 \cdot 51}$

28. $$P\{\text{same}\} = \frac{\binom{5}{3} + \binom{6}{3} + \binom{8}{3}}{\binom{19}{3}}$$

$$P\{\text{different}\} = \binom{5}{1}\binom{6}{1}\binom{8}{1} \Big/ \binom{19}{3}$$

If sampling is with replacement

$$P\{\text{same}\} = \frac{5^3 + 6^3 + 8^3}{(19)^3}$$

$$P\{\text{different}\} = P(RBG) + P\{BRG) + P(\text{RGB}) + \ldots + P(GBR)$$
$$= \frac{6 \cdot 5 \cdot 6 \cdot 8}{(19)^3}$$

35. $1 - \binom{30}{3} \Big/ \binom{54}{3} \approx .8363$

37. (a) $\binom{7}{5} \Big/ \binom{10}{5} = 1/12 \approx .0833$

(b) $\binom{7}{4}\binom{3}{1} \Big/ \binom{10}{5} + 1/12 = 1/2$

39. $\frac{5 \cdot 4 \cdot 3}{5 \cdot 5 \cdot 5} = \frac{12}{25}$

43. $\frac{2(n-1)(n-2)}{n!} = \frac{2}{n}$ in a line

$\frac{2n(n-2)!}{n!} = \frac{2}{n-1}$ if in a circle, $n \geq 2$

<u>Theoretical Ex.</u>

6. (a) EF^cG^c

(b) EF^cG

(c) $E \cup F \cup G$

(d) $EF \cup EG \cup FG$

(e) EFG

(f) $E^cF^cG^c$

(g) $E^cF^cG^c \cup EF^cG^c \cup E^cFG^c \cup E^cF^cG$

(h) $(EFG)^c$

(i) $EFG^c \cup EF^cG \cup E^cFG$

(j) S

11. $1 \geq P(E \cup F) = P(E) + P(F) - P(EF)$

13. $E = EF \cup EF^c$