

Answers for Math 1833 Test 1 (Fall 2006)

1. (a) $X^c \cap Y^c = (X \cup Y)^c = \emptyset$
 (b) $X \cup (Y \cap Z) = U$

2. (a) Draw a Venn diagram or use the formula:

$$n(T \cup G \cup S) = n(T) + n(S) + n(G) - n(T \cap S) - n(T \cap G) - n(G \cap S) + n(T \cap G \cap S) = 46.$$

(b) $n(T \cap S^c \cap G^c) = 2.$

3. $C(5, 2)C(6, 2)$

4. Permutations of 9 letters, 3 Is, 2 Ms: $\frac{9!}{3!2!}$

5. (a) $P(7, 4)$

(b) $\frac{4 \cdot P(6, 3)}{P(7, 4)}$

6. $p(V \cup M) = p(V) + p(M) - p(V \cap M) = 0.6 + 0.55 - 0.33$

7. (a) $p(A^c) = 1 - p(A) = 1 - 0.35 = 0.65$

(b) $p(A \cap B) = p(A) + p(B) - p(A \cup B) = 0.35 + 0.55 - 0.8 = 0.1$

(c) $p(A^c \cup B^c) = p((A \cap B)^c) = 1 - p(A \cap B) = 1 - 0.1 = 0.9$

(d) $p((A \cup B)^c) = 1 - p(A \cup B) = 1 - 0.8 = 0.2$

- 8.

$$p(E) = \frac{C(6, 1) \cdot C(4, 1) + C(6, 2)}{C(10, 2)}$$

9. There is a typo in this question. There are 4 vacancies, so obviously the company is choosing 4 trainees.

(a) $C(9, 4)$

(b) $p = \frac{C(5, 2) \cdot C(4, 2)}{C(9, 4)}$

10. (a) $p(R|G) = 3/9$

(b) $p(R \cap G) = p(G)p(R|G) = 7/10 \cdot 3/9$

11. (a) $p(D) = p(B)p(D|B) + p(R)p(D|R) = 0.2 \cdot 0.07 + 0.8 \cdot 0.04$

(b)

$$\begin{aligned} p(B|D) &= \frac{p(B \cap D)}{p(D)} \\ &= \frac{p(B)p(D|B)}{p(B)p(D|B) + p(R)p(D|R)} \\ &= \frac{0.2 \cdot 0.07}{0.2 \cdot 0.07 + 0.8 \cdot 0.04} \end{aligned}$$