# Probability Using Sets

1) a) $n(T) = 14 + 3 + 10 + 5$
$= 32$

b) $n(T \cap G) = 3 + 10$
$= 13$

c) $n(G \cup I) = 4 + 3 + 10 + 1 + 5 + 17$
$= 40$

d) $n(T \cap G \cap I) = 10$

e) $n(T \cup G \cup I \cup F) = 14 + 3 + 4 + 5 + 10 + 1 + 17 + 7$
$= 61$

f) $n(I') = 61 + 6 - 5 - 10 - 1 - 17$
$= 34$

g) $n((T \cup G \cup I \cup F)') = 6$

2) a) $n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$= 18 + 15 - 10$
$= 23$

b) $P(C \cup D) = P(C) + P(D) - P(C \cap D)$
$P(D) = P(C \cup D) - P(C) + P(C \cap D)$
$= 0.75 - 0.6 + 0.3$
$= 0.45$

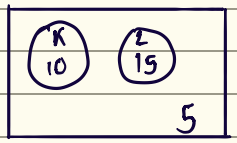
c) $n(E \cup F) = n(E) + n(F) - n(E \cap F)$
$n(E \cap F) = n(E) + n(F) - n(E \cup F)$
$= 13 + 12 - 25$
$= 0$

d) $P(G \cup H) = 1 - P((G \cup H)')$
$= 0.85$
$P(G \cup H) = P(G) + P(H) - P(G \cap H)$
$P(G) = P(G \cup H) - P(H) + P(G \cap H)$
$= 0.85 - 0.6 + 0.3$
$= 0.55$

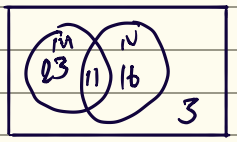
3) a) $n(I \cup J) = n(I) + n(J)$
$= 6 + 10$
$= 16$

b) $P(I \cup J) = P(I) + P(J)$
$P(J) = P(I \cup J) - P(I)$
$= 0.95 - 0.65$
$= 0.30$

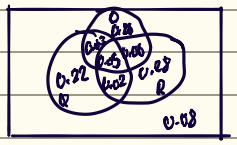
4) a)




b)

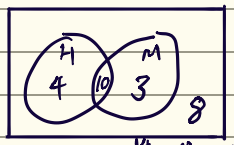



c)




5) $P(P) = \frac{3}{4}$
$P(S) = \frac{2}{3}$
$P(S \cap P) = \frac{1}{2}$
$P(S \cup P) = P(P) + P(S) - P(\frac{1}{2})$
$= \frac{11}{12}$

6) a)




b) $P(H \cup M) = \frac{14}{25} + \frac{13}{25} - \frac{10}{25}$
$= \frac{17}{25}$

7) a)

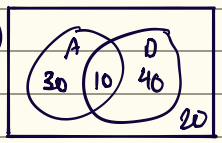
| R | B | G |
|---|---|---|
| 5 | 9 | 10 |

b) $P(R) = \frac{5}{24}$

c) $P(R \cap B) = 0$

d) $P(R \cup B \cup G) = \frac{24}{24}$
$= 1$

8) a)



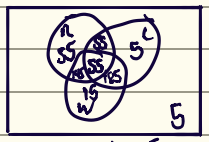

$n(A \cup D) = 100 - n(A \cap D)$
$= 100 - 20$
$= 80$

$n(A \cap D) = n(A) + n(D) - n(A \cup D)$
$= 40 + 50 - 80$
$= 10$

b) $P(A \cap D) = \frac{10}{100}$
$= \frac{1}{10}$

c) $P(D) = \frac{20}{100}$
$= \frac{2}{5}$

9) a)




b) $P((R \cup C \cup W)') = \frac{5}{500}$
$= \frac{1}{100}$

c) $P(R \cap C) = \frac{55}{500}$
$= \frac{11}{100}$

10) a) $n(A) = 4$
$n(C) = 13$
$n(A \cap C) = 1$
$n(A \cup C) = n(A) + n(C) - n(A \cap C)$
$= 16$
$P(A \cup C) = \frac{16}{52} = \frac{4}{13}$

10) b) $n(F) = 12$

$n(S) = 13$

$n(F \cap S) = 3$

$n(F \cup S) = n(F) + n(S) - n(F \cap S)$

$= 22$

$P(F \cup S) = \frac{22}{52}$

$= \frac{11}{26}$

c) $n(5) = 4$

$n(10) = 4$

$n(5 \cup 10) = n(5) + n(10)$

$= 8$

$P(5 \cup 10) = \frac{8}{52}$

$= \frac{2}{13}$

5 1 1 5

5 2 2 5

5 3 3 5

5 4 4 5

5 5 5 5

5 6 6 5

11) $n(\text{Sum } 7) = 15$

$n(5) = 12$

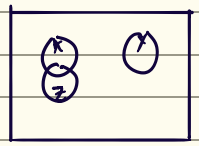
$n(\text{Sum } 7 \cap 5) = 8$

$n(\text{Sum } 7 \cup 5) = n(\text{Sum } 7) + n(5) - n(\text{Sum } 7 \cap 5)$

$= 19$

$P(\text{Sum } 7 \cup 5) = \frac{19}{36}$

12)




13) a) $P(A \cup B \cup C) = P(A) + P(B) + P(C)$

b) $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C)$

c) $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + P(A \cap B \cap C)$