

# Assignment 42

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## 1 a

(a)

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

$$P(A \cap B) = \frac{1}{2} + \frac{2}{3} - \frac{5}{6}$$

$$P(A \cap B) = \frac{3}{6} + \frac{4}{6} - \frac{5}{6}$$

$$P(A \cap B) = \frac{2}{6}$$

(b) *No since a partition of  $S$  is a non-overlapping collection of sets whose union is  $S$ .*

(c)

$$P(C - (A \cup B)) = P(C) - P(A \cup B)$$

$$= P(C) - \frac{5}{6}$$

(d) *if*

$$P(C \cap (A \cup B)) = \frac{5}{12}$$

*And since*

$$A \cup B = \frac{5}{6}$$

*Then*

$$P(C) = 1 - \frac{5}{6} + \frac{5}{12} = \frac{7}{12}$$

## 2 b

(a)

**3 c**

- (a) *the range is [0, 2]*
- (b)  $\frac{1}{6}$
- (c)  $\frac{1}{3}$
- (d) *if*

$$\begin{aligned} P(X = 0 | X < 2) &= \frac{P(0 = X \text{ and } X < 2)}{P(X < 2)} \\ &= \frac{\frac{1}{5}}{\frac{2}{6}} \\ &= \frac{3}{5} \end{aligned}$$

**4 d**

$$\left\{ \begin{array}{l} \frac{1}{36} \quad Z = -5 \\ \frac{2}{36} \quad Z = -4 \\ \frac{3}{36} \quad Z = -3 \\ \frac{4}{36} \quad Z = -2 \\ \frac{5}{36} \quad Z = -1 \\ \frac{6}{36} \quad Z = 0 \\ \frac{5}{36} \quad Z = 1 \\ \frac{4}{36} \quad Z = 2 \\ \frac{3}{36} \quad Z = 3 \\ \frac{2}{36} \quad Z = 4 \\ \frac{1}{36} \quad Z = 5 \end{array} \right.$$

**5 e**

- (a)

$$\begin{aligned} P(A|B) &= \frac{P(A \cap B)}{P(B)} \\ &= \frac{.2}{.35} \end{aligned}$$

- (b)

$$\begin{aligned} P(C|B) &= \frac{P(C \cap B)}{P(B)} \\ &= \frac{.15}{.35} \end{aligned}$$

(c)

$$\begin{aligned} P(B|A \cup C) &= \frac{P(B \cap (A \cup C))}{P(A \cup C)} \\ &= \frac{.25}{.7} \end{aligned}$$

(d)

$$\begin{aligned} P(B|A \cup C) &= \frac{P(B \cap (A \cup C))}{P(A \cup C)} \\ &= \frac{.25}{.7} \end{aligned}$$

**6 f**

$$3 * \frac{5 \ 95 \ 94}{100 \ 99 \ 98}$$