Pishro-Nik Probabilities

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Problem 31-1

Problems in form of images...

Solution

Problem a:

a.

$$P(X_2 = 4) = \frac{1}{6} = 0.1667$$

b.

$$P(X_1 + X_2 = 7) = \frac{6}{36} \text{ (six out of thirty six total outcomes)} = 0.1667$$

c.

$$P(X_1 \neq 2 \text{ and } X_2 \geq 4) = P(X_1 \neq 2) \cdot P(X_2 \geq 4) = \frac{5}{6} \cdot \frac{3}{6} = \frac{15}{36} = 0.4167$$

Problem b:

a.

$$P(A \cap B) = P(A) + P(B) - P(A \cup B) = 0.4 + 0.7 - 0.9 = 0.2$$

b.

$$P(A^c \cap B) = P(B) - P(A \cap B) = 0.7 - 0.2 = 0.5$$

c.

$$P(A - B) = P(A) - P(A \cap B) = 0.4 - 0.2 = 0.2$$

d.

$$P(A^c - B) = 0.1$$

e.

$$P(A^c \cup B) = P(B) = 0.8$$

f.

$$P(A \cap (B \cup A^c)) = P(A \cap B) = 0.2$$

Problem c:

$$P(k \text{ red balls (repeated draws)}) = \binom{20}{k}(0.3)^k(0.7)^{20-k}$$

Problem d:

$$P(k \text{ red balls (no repeated draws)}) = \frac{\binom{30}{k} \cdot \binom{70}{20-k}}{\binom{100}{20}}$$

Problem e: