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(1) $P(R) = 0.4$ $P(B) = 0.3$ $P(G) = 0.3$

$P(R \cap G) = 0.07$ $P(B \cap R) = 0.05$ $P(G \cap B) = 0.1$

$P(R \cup G \cup B) = P(R) + P(B) + P(G) - P(R \cap B) - P(R \cap G) - P(G \cap B) + P(R \cap B \cap G)$

let $X = P(R \cap B \cap G)$

$0.4 + 0.3 + 0.3 - 0.05 - 0.07 - 0.1 + X = 0.86$

$X = 0.08$

(2) Probability first card is spade $= \frac{13}{52}$

Probability second card is spade $= \frac{12}{51}$

Probability 2 cards are spade $= \frac{13}{52} \times \frac{12}{51} = \frac{1}{17}$

(3) Probability (win tournament) $= 0.8 \times 0.4 = 0.32$

(4) $P(H) = 0.9$ $P(C|H) = 0.6$ $P(G|C) = 0.2$

$P(\text{Advanced degree}) = 0.9 \times 0.6 \times 0.2 = 0.108$

(5) scenario 1

$$P(\text{first is red}) = \frac{5}{15}$$

$$P(\text{second is red}) = \frac{4}{14}$$

scenario 2

$$P(\text{first is black}) = \frac{10}{15}$$

$$P(\text{second is red}) = \frac{5}{14}$$

$$\text{Probability} = \left(\frac{5}{15} \times \frac{4}{14}\right) + \left(\frac{10}{15} \times \frac{5}{14}\right) = \frac{1}{3}$$

(6) fraction of students pass the final is X

$$P(X) = (0.8)(0.7) + (0.4) \times (0.3) = \frac{17}{25} = 0.68$$