3.5 Conditional Probability

Dependent Events

→ Events whose outcomes are affected by each other.

Conditional Probability

→ the probability of an event occuring given that another event has already occured

3.6 Independent Events

→ when event B does NOT depend on event A.

Ex: Rolling a 6 on a die and drawing a heart from a deck of cards.

Probability of Independent events is equal to the product of the individual probabilities.

#2. T < F, M

E < F, M

B < F, M

$\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$

#3 $P(E) = \frac{1}{4}$ $P(TR) = \frac{1}{4}$

$P(E \text{ and } TR) = \frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$ with Repetition

without repetition:

$P(E) = \frac{1}{4}$ $P(TR) = \frac{1}{3}$

$P(E \text{ and } TR) = \frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$

$P(E \cap TR) = P(E) \times P(TR)$

Note: For Independent event A and B, the probability of both events occuring is given by $P(A \cap B) = P(A) \times P(B)$

#5. (a) $P(A) = 0.35$ $P(B) = 0.4$

$P(A \cap B) = 0.12$ Are A and B independent?

$P(A) \times P(B) = 0.35 \times 0.4 = 0.14$

Since $P(A) \times P(B) = P(A \cap B)$ for independent events and here $P(A) \times P(B) = 0.14 \neq P(A \cap B)$ these events are not independent.

(b) $P(Q) = 0.720$ $P(R) = 0.650$

$P(Q \cap R) = 0.468$

Check: $P(Q) \times P(R) = 0.720 \times 0.650 = 0.46 = P(Q \cap R)$

Therefore Q and R are independent.

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TRY: #4 (a) (7) & 9 13 15

#7. 40 cards 10 of each suit.

$P(C \cap H)$

$P(C) = \frac{10}{40} = \frac{1}{4} = 0.25$

$P(H|C) = \frac{10}{39}$

$P(C \cap H) = P(C) \cdot P(H|C)$

$P(C \cap H) = \frac{1}{\cancel{4}_{2}} \times \frac{\cancel{10}^{5}}{39} = \frac{5}{78} = 0.064$

OR 6.4%