

b) A coin is tossed 3 times, so, the possible outcomes are following.

$$\Omega = \{HHH, HHT, HTH, THH, TTT, TTH, THT, HTT\}$$

(i)  $E$  : Head on third toss.

Outcomes are :  $\{HHH, HTH, THH, TTH\}$ .

$$P(E) = \frac{4}{8} = \frac{1}{2}$$

$F$  : Heads on first two tosses.

Outcomes are :  $\{HHH, HHT\}$ .

$$P(F) = \frac{2}{8} = \frac{1}{4}$$

$$P(E \cap F) = \{HHH\} = \frac{1}{8}$$

$$\therefore P(E/F) = \frac{P(E \cap F)}{P(F)} = \frac{1/8}{1/4} = \frac{1}{2}$$

(ii)  $E$  : Atleast Two heads.

Outcomes are :  $\{HHH, HHT, HTH, THH\}$ .

$$P(E) = \frac{4}{8} = \frac{1}{2}$$

$F$  : Atmost Two heads.

Outcomes are :  $\{HHT, HTH, THH, TTT, TTH, THT, HTT\}$

$$P(F) = 7/8$$

$$\Rightarrow P(E \cap F) = \{HHT, HTH, THH\}.$$

$$P(E \cap F) = 3/8.$$

$$P(E/F) = \frac{P(E \cap F)}{P(F)} = \frac{3/8}{7/8} = \frac{3}{7}.$$

(iii) E: At most two tails.

Outcomes are:  $\{HHH, HHT, HTH, THH, TTH, THT, HTT\}$ .

$$P(E) = 7/8.$$

F: At least one tail.

Outcomes are:  $\{HHT, HTH, THH, TTH, THT, HTT, TTT\}$ .

$$P(F) = 7/8.$$

$E \cap F = \{HHT, HTH, THH, TTH, THT, HTT\}$ .

$$P(E \cap F) = 6/8.$$

$$\therefore P(E/F) = \frac{P(E \cap F)}{P(F)} = \frac{6/8}{7/8} = \frac{6}{7}.$$