Assignment on Probability

① $P('6') = \frac{1}{6}$

$P(\text{even\_sum}) = ?$

$P(6 \cap \text{even\_sum}) = P(6) \times P(\text{even\_sum}/6)$

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

$= \frac{3}{36} = \boxed{\frac{1}{12}}$

② $P(\text{sum} < 7) = \frac{15}{36}$ $\begin{bmatrix} (1,1) & (2,1) & (3,1) & (4,1) & (5,1) \\ (1,2) & (2,2) & (3,2) & (4,2) & \\ (1,3) & (2,3) & (3,3) & & \\ (1,4) & (2,4) & & & \\ (1,5) & & & & \end{bmatrix}$

③ $P(1h) = 1 - \frac{1}{8} = \frac{7}{8}$ $P(2h) = \frac{4}{8}$

$P(2h/1h) = ?$

$P(2h/1h) = \frac{P(1h/2h) \times P(2h)}{P(1h)}$

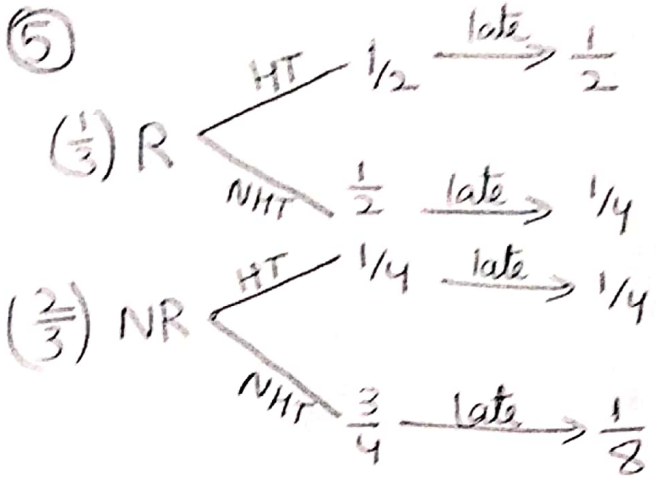
$= \frac{1 \times \frac{4}{8}}{\frac{7}{8}} = \boxed{\frac{4}{7}}$

④ $P(1g) = 1 - \frac{1}{4} = \frac{3}{4}$

$P(2g/1g) = ?$

$P(2g/1g) = \frac{P(1g/2g) \times P(2g)}{P(1g)} = \frac{1 \times \frac{1}{4}}{\frac{3}{4}} = \boxed{\frac{1}{3}}$

(5)



a) $P(NR \cap HT) \cap NL$

$[P(NR) \times P(HT/NR)] \cap NL$

$\left[\frac{2}{3} \times \frac{1}{4_2}\right] \cap NL$

$\left[\frac{1}{6}\right] \cap NL$

$\frac{1}{6_2} \times \frac{3}{4} = \boxed{\frac{1}{8}}$

b) $P(L) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{3} + \frac{1}{4} \times \frac{1}{2} \times \frac{1}{3} + \frac{1}{4} \times \frac{1}{4} \times \frac{2}{3} + \frac{1}{8} \times \frac{3}{4} * \frac{2}{3}$

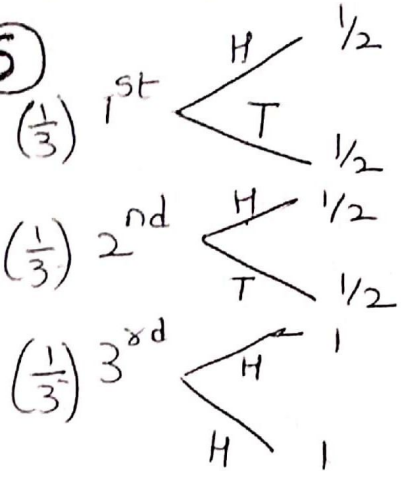
$= \frac{1}{12} + \frac{1}{24} + \frac{1}{24} + \frac{1}{16}$

$= \frac{4+2+2+3}{48} = \boxed{\frac{11}{48}}$

c) $P(R/L) = \frac{P(L/R) \times P(R)}{P(L)} = \frac{\frac{1}{2} \times \frac{1}{2} \times \frac{1}{3} + \frac{1}{4} \times \frac{1}{2} \times \frac{1}{3}}{\frac{11}{48}}$

$= \frac{\frac{1}{8}}{\frac{11}{48}} = \frac{6}{11}$

(6)



a) $P(H) = \frac{1}{2} \times \frac{1}{3} + \frac{1}{2} \times \frac{1}{3} + 1 \times \frac{1}{3}$

$= \frac{1}{6} + \frac{1}{6} + \frac{1}{3} = \frac{2}{6_3} + \frac{1}{3}$

$= \boxed{\frac{2}{3}}$

b) $P(2H/H) = \frac{P(H/2H) \times P(2H)}{P(H)}$

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

(7) Only Information provided

(8) $P(T/W) = \frac{5}{6}$ $P(T/NW) = \frac{1}{6}$

$P(W) = \frac{1}{9}$ $P(NW) = \frac{8}{9}$

$P(W/T) = \frac{P(T/W) \times P(W)}{P(T)}$

$= \frac{\frac{5}{6} \times \frac{1}{9}}{\frac{5}{6} \times \frac{1}{9} + \frac{1}{6} \times \frac{8}{9}} = \boxed{\frac{5}{13}}$

(9) $P(T/6) = \frac{4}{5}$ $P(T/NG) = \frac{1}{5}$

$P('6') = \frac{1}{6}$ $P('NG') = \frac{5}{6}$

$$P('6'/T) = \frac{P(T/'6') \times P(6)}{P(T)}$$

$$= \frac{\frac{4}{5} \times \frac{1}{6}}{\frac{4}{5} \times \frac{1}{6} + \frac{1}{5} \times \frac{5}{6}} = \frac{\frac{4}{30}}{\frac{9}{30}}$$

$$= \boxed{\frac{4}{9}}$$

(10) $P(M \cap S) = \frac{40}{100}$

$P(M) = \frac{60}{100}$

$$P(S/M) = \frac{P(M/S) \times P(S)}{P(M)} = \frac{P(M \cap S)}{P(M)}$$

$$= \frac{\frac{40}{100}}{\frac{60}{100}} = \boxed{\frac{2}{3}}$$

(11) a) $P(M \cap Q) = P(M) \times P(Q/M)$

$= \frac{60}{100} \times \frac{19}{60}$

$= \boxed{\frac{19}{100}}$. It is Joint Probability

b) $P(M) = \boxed{\frac{60}{100}}$

c) $P(Q) = \boxed{\frac{31}{100}}$. It is Marginal Probability

d) $P(F/PQ) = \frac{P(PQ/F) \times P(F)}{P(PQ)}$

$= \frac{\frac{28}{40} \times \frac{40}{100}}{\frac{69}{100}} = \boxed{\frac{28}{69}}$. It is conditional Probability

(12) $P(FF) = 0.1$

$P(NFF) = 0.9$

	FF	NFF
+ve	92%	10%
-ve	8%	90%

$P(F/+ve) = ?$

$= \frac{P(+ve/F) \times P(F)}{P(+ve)}$

$= \frac{\frac{92}{100} \times 0.1}{\frac{92}{100} \times 0.1 + \frac{10}{100} \times 0.9} = \boxed{0.50}$

(13) Did not know, how to solve.

(14) $P(S) = \frac{1}{10,000} = 0.0001$

$P(NS) = 0.9999$

	S	NS
+ve	99% (TP)	1% (F+ve)
-ve	1% (F-ve)	100% (T-ve)

$P(S/+ve) = ?$

$$= \frac{P(+ve/S) \times P(S)}{P(+ve)}$$

$$= \frac{\frac{99}{100} \times 0.0001}{\frac{99}{100} \times 0.0001 + \frac{1}{100} \times 0.9999}$$

$$= \boxed{0.0098}$$