1. Bayesian Inference

R = report (a, b)

t = theif (A, B)

a)

$$= P(A|a) = \frac{P(a|A) \times P(A)}{P(a)}$$

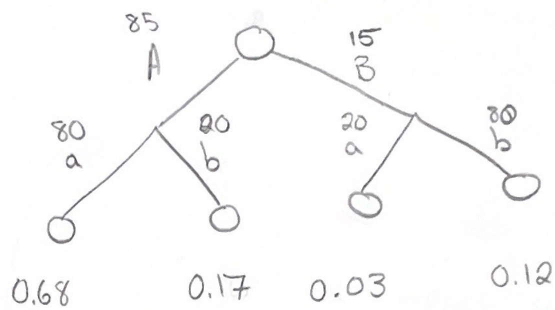
$$0.9577 = \frac{0.80 \times 0.85}{(0.68 + 0.03)} = \frac{0.68}{0.71} = 95\%$$

b)

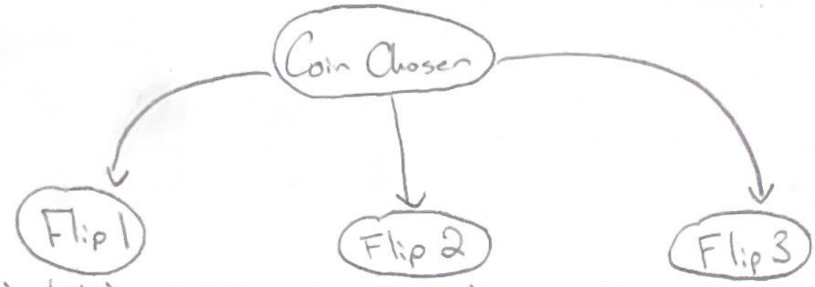
$$P(A|b) = \frac{P(b|A) \times P(A)}{P(b)}$$

$$0.5862 = \frac{(0.2) \times (0.85)}{(0.17 + 0.12)} = \frac{0.17}{0.29} = 58.6\%$$

1a)



2a)



Flip 1

	P(H)	P(T)
A	0.2	0.8
B	0.6	0.4
C	0.8	0.2

Flip 2

	P(H)	P(T)
A	0.2	0.8
B	0.6	0.4
C	0.8	0.2

Flip 3

	P(H)	P(T)
A	0.2	0.8
B	0.6	0.4
C	0.8	0.2

2b)

$$P(A \mid \overbrace{\text{Flip1} + \text{Flip2} + \text{Flip3} = 2}^{f})$$

$$= \frac{P(f \mid A) \times P(A)}{P(f)} = \frac{P(f \mid A) \times \left(\frac{1}{3}\right)}{P(f)}$$

$$= \frac{(0.032 + 0.032 + 0.032) \times \left(\frac{1}{3}\right)}{0.032 + 0.144 + 0.128}$$

$$f = (P_1(H) \times P_2(H) \times P_3(T)) + (P_2(H) \times P_3(H) \times P_1(T)) + (P_1(H) \times P_3(H) \times P_2(T))$$

$$0.2 \times 0.2 \times 0.8 = 0.032$$

$$f_1 = (0.032) + (0.032)\ (0.032)$$

$$P(A \mid f) = \frac{0.032}{0.3} = 0.105263 = \boxed{10.53\%}$$

$$P(2H + 1T \mid B) = 0.6 \times 0.6 \times 0.4$$

$$P(B \mid f) = \frac{(0.144 + 0.144 + 0.144) \times \frac{1}{3}}{0.032 + 0.144 + 0.128}$$

$$= \frac{0.144}{.304} = 0.47368 = \boxed{47.37\%}$$

$$P(2H + 1T \mid C) = 0.8 \times 0.8 \times 0.2$$

$$P(C \mid f) = \frac{(.128 + 0.128 + 0.128) \times \frac{1}{3}}{0.032 + 0.144 + 0.128}$$

$$= \frac{0.128}{0.304} = .42105 = \boxed{42.11\%}$$