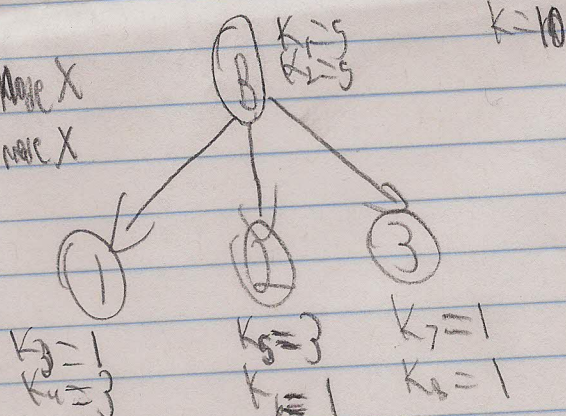


Task 2B

$E(X)$ = Entropy of Node X
 $W(X)$ = Weight of Node X



$$\text{Information Gain} = E(8) - W(1)E(1) - W(2)E(2) - W(3)E(3)$$

$$E(8) = -\frac{K_1}{K} \log_2 \frac{K_1}{K} - \frac{K_2}{K} \log_2 \frac{K_2}{K} = 1$$

$$W(1) = 0.4$$

$$E(1) = -\frac{K_3}{K_1+K_4} \log_2 \left(\frac{K_3}{K_1+K_4} \right) - \frac{K_4}{K_1+K_4} \log_2 \left(\frac{K_4}{K_1+K_4} \right) \\ = -(0.25) \log_2 (0.25) - (0.75) \log_2 (0.75) = 0.81128$$

$$W(2) = 0.4$$

$$E(2) = -\frac{K_5}{K_2+K_6} \log_2 \left(\frac{K_5}{K_2+K_6} \right) - \frac{K_6}{K_2+K_6} \log_2 \left(\frac{K_6}{K_2+K_6} \right) \\ = -(0.75) \log_2 (0.75) - (0.25) \log_2 (0.25) = 0.81128$$

$$W(3) = 0.2$$

$$E(3) = -\frac{K_7}{K_3+K_8} \log_2 \left(\frac{K_7}{K_3+K_8} \right) - \frac{K_8}{K_3+K_8} \log_2 \left(\frac{K_8}{K_3+K_8} \right) \\ = -(0.5) \log_2 (0.5) - (0.5) \log_2 (0.5) = -(0.5)(-1) - (0.5)(-1) \\ = 1$$

$$\# \text{ Information gain} = 1 - (0.4)(0.81128) - (0.4)(0.81128) - (0.2)(1)$$