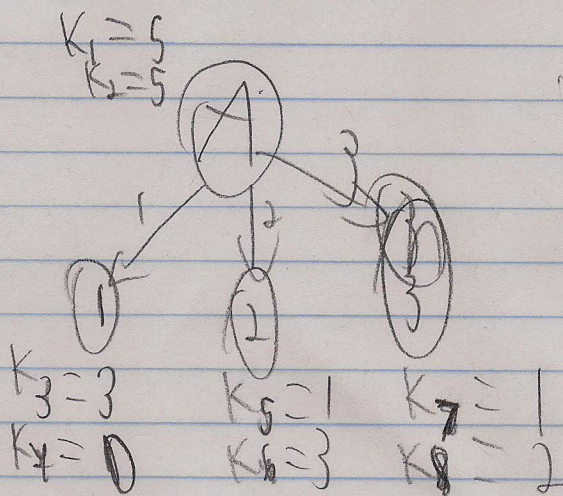


Task 2A



$K = 10$

K_1, K_2, K_3

$$\text{Information gain} = \text{Entropy}(A) - \text{Weight}(1) \text{Entropy}(1) - \text{Weight}(2) \text{Entropy}(2) - \text{Weight}(3) \text{Entropy}(3)$$

$$\text{Entropy}(A) = -\frac{K_1}{K} \log_2 \frac{K_1}{K} - \frac{K_2}{K} \log_2 \frac{K_2}{K} = -\frac{1}{2} \log_2 \left(\frac{1}{2}\right) - \frac{1}{2} \log_2 \left(\frac{1}{2}\right) = -\frac{1}{2}(-1) - \frac{1}{2}(-1) = \frac{1}{2} + \frac{1}{2} = 1$$

$$\text{Weight}(1) = 0.3$$

$$\text{Entropy}(1) = -\frac{K_3}{K_3+K_4} \log_2 \left(\frac{K_3}{K_3+K_4}\right) - \frac{K_4}{K_3+K_4} \log_2 \left(\frac{K_4}{K_3+K_4}\right) = -\frac{3}{3} \log_2 \left(\frac{3}{3}\right) - 0 = 0 - 0 = 0$$

$$\text{Weight}(2) = 0.4$$

$$\text{Entropy}(2) = -\frac{K_5}{K_5+K_6} \log_2 \left(\frac{K_5}{K_5+K_6}\right) - \frac{K_6}{K_5+K_6} \log_2 \left(\frac{K_6}{K_5+K_6}\right) = -0.25 \log_2(0.25) - 0.75 \log_2(0.75) = -0.25(-2) - 0.75(-0.91509) = 0.5 + 0.68632 = 1.18632$$

$$\text{Weight}(3) = 0.3$$

$$\text{Entropy}(3) = -\frac{K_7}{K_7+K_8} \log_2 \left(\frac{K_7}{K_7+K_8}\right) - \frac{K_8}{K_7+K_8} \log_2 \left(\frac{K_8}{K_7+K_8}\right) = -\frac{1}{3} \log_2 \left(\frac{1}{3}\right) - \frac{2}{3} \log_2 \left(\frac{2}{3}\right) = -\frac{1}{3}(-1.58496) - \frac{2}{3}(-0.58496) = 0.52832 + 0.38997 = 0.91829$$