Assignment 11

Tuesday, May 5, 2020 5:26 PM

1) $R(V_p) = 50 - \sum_{i=1}^{100} y^i$

$R(Down) = -50 + \sum_{i=1}^{100} y^i$

$50 - \sum_{i=1}^{100} y^i = -50 + \sum_{i=1}^{100} y^i$

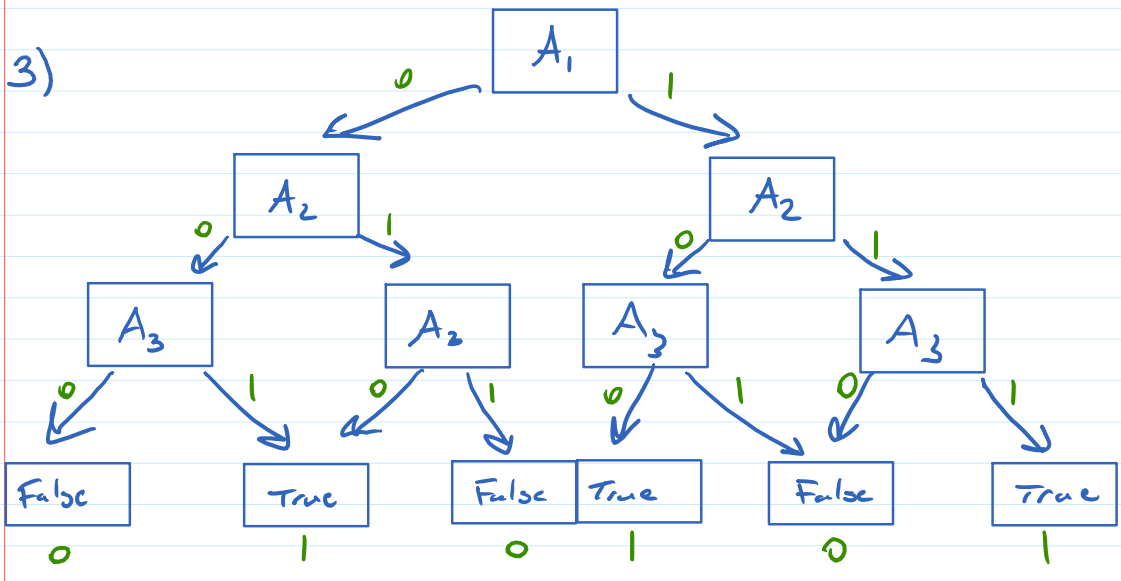
$50 + 50 = \sum_{i=1}^{100} y^i + \sum_{i=1}^{100} y^i$

$2 \cdot 50 = 2 \cdot \sum_{i=1}^{100} y^i$

$\frac{50}{100} = \frac{1}{2} \sum_{i=1}^{100} y^i$

$y = 0.9844$ Down $y > 0.9844$ Up $y < 0.9844$

3)



2) $Gain(A) = B\left(\frac{p}{p+n}\right) - Remainder(A)$

$$B\left(\frac{p}{p+n}\right) = \frac{2}{2+3} = B\left(\frac{2}{5}\right) = -(0.4 \log_2 0.4 + 1-0.4 \log_2(1-0.4)$$
$$= -(-0.972)$$
$$= \boxed{0.972}$$

$$\text{Remainder}(A) = \sum_{k=1}^{d} \frac{p_k + n_k}{p+n} B\left(\frac{p_k}{p_k+n_k}\right)$$

2a) $\text{Gain}(A_1) = B\left(\frac{2}{5}\right) - \left(\frac{4}{5} B\left(\frac{1}{2}\right) + \frac{1}{5} B(0)\right)$

$$= 0.972 - \left(\frac{4}{5}\left(-(0.5 \log_2 0.5 + (1-0.5) \log_2(1-0.5)\right) + \frac{1}{5}\left(-(0 \log_2 0 + (1-0) \log_2(1-0)\right)\right)$$

$$= 0.972 - 0.8$$
$$= \boxed{0.172}$$

2b) $\text{Gain}(A_2) = 0.972 - \left(\frac{3}{5} B\left(\frac{2}{3}\right) + \frac{2}{5} B\left(\frac{0}{2}\right)\right)$

$$= 0.972 - \left(\frac{3}{5} B(0.67) + \frac{2}{5} B(0)\right)$$

$$= 0.972 - 0.55$$
$$= \boxed{0.422}$$

2c) $\text{Gain}(A_3) = 0.972 - \left(\frac{2}{5} B\left(\frac{1}{2}\right) + \frac{3}{5} B\left(\frac{1}{3}\right)\right)$

$$= 0.972 - \left(\frac{2}{5} \times 1 + \frac{3}{5} \times 0.917\right)$$

$$= 0.972 - 0.95$$
$$= \boxed{0.022}$$