Quiz 7

f_1	f_2	Y
A	A	Y
A	A	N
A	B	N
A	B	Y
B	A	Y
B	B	N
B	A	N
B	A	N

Y = 3
N = 5

$$\text{Info}(D) = -\sum_{i=1}^{m} p_i \log_2(p_i)$$

$$= I(3,5)$$

$$= -\frac{3}{8}\log_2\left(\frac{3}{8}\right) - \frac{5}{8}\log_2\left(\frac{5}{8}\right)$$

$$= 0.53 + 0.42$$

$$= 0.9544$$

$$\text{Info}_{f_1}(D) = \frac{4}{8} I(2,2) + \frac{4}{8} I(1,3)$$

$$= \frac{4}{8}\left(-\frac{2}{4}\log_2\left(\frac{2}{4}\right) - \frac{2}{4}\log_2\left(\frac{2}{4}\right)\right) + \frac{4}{8}\left(-\frac{1}{4}\log_2\left(\frac{1}{4}\right) - \frac{3}{4}\log_2\left(\frac{3}{4}\right)\right)$$

$$= 0.5 + 0.405$$

$$= 0.9056$$

$$\text{Info}_{f_2}(D) = \frac{5}{8} I(2,3) + \frac{3}{8} I(1,2)$$

$$= \frac{5}{8}\left(-\frac{2}{5}\log_2\left(\frac{2}{5}\right) - \frac{3}{5}\log_2\left(\frac{3}{5}\right)\right) + \frac{3}{8}\left(-\frac{1}{3}\log_2\left(\frac{1}{3}\right) - \frac{2}{3}\log_2\left(\frac{2}{3}\right)\right)$$

$$= 0.6068 + 0.3444$$

$$= 0.9511$$

$$\text{Gain}(f_1) = 0.9544 - 0.9056 = 0.04$$

$$\text{Gain}(f_2) = 0.9544 - 0.9511 = 0.003$$