Overcast 4 samples 4 yes, 0 No

$$\text{Entropy(overcast)} = -\left(\frac{4}{4}\right)\cdot\log_2\left(\frac{4}{4}\right) - \left(\frac{0}{4}\right)*\log_2\left(\frac{0}{4}\right) = 0.$$

No info gain since it's all yes.

Rainy 5 samples 3 Yes, 2 NO

$$\text{Entropy(rainy)} = -\left(\frac{3}{5}\right)\log_2\left(\frac{3}{5}\right) - \left(\frac{2}{5}\right)\log_2\left(\frac{2}{5}\right)$$

$$= 0.442 + 0.529 = 0.971$$

Temperature mild 3 cool 2

mild: Yes 2, NO 1

cool: Yes 1, NO 1

$$\text{Gain(rainy, temp)} = 0.971 - \left[\frac{3}{5}\left(-\frac{2}{3}\log_2\left(\frac{2}{3}\right) - \frac{1}{3}\log_2\left(\frac{1}{3}\right)\right)\right] - \left[\frac{2}{5}\left(-\frac{1}{2}\log_2\left(\frac{1}{2}\right) - \frac{1}{2}\log_2\left(\frac{1}{2}\right)\right)\right]$$

$$= 0.971 - 0.951 = 0.02$$

Humidity High 2 Normal 3

High: Yes 1, NO 1

Normal: Yes 2, NO 1