Blatt 6

1a) $S = (ja, ja, ja, nein, ja, nein, ja, ja, ja, ja, nein)$

$P_{ja} = 8/11 \qquad P_{nein} = 3/11$

$H(S) = -\frac{8}{11}\log_2\frac{8}{11} - \frac{3}{11}\log_2\frac{3}{11} = 0{,}8454$

$H(S) = \sum_{i=1}^{c} -p_i \lg_2(p_i)$

Wissen

$p_{gut} = 5/11 \qquad p_{mittel} = 3/11 \qquad p_{schlecht} = 4/11$

$V_{Wissen} = (gut, mittel, schlecht)$

$G(S,A) = H(S) - \sum_{i=1}^{A} \frac{|S_i|}{|S|} H(S_i)$

$S_{gut} = (4\,ja, 1\,nein) \qquad S_{mittel} = (1\,ja, 1\,nein)$

$S_{schlecht} = (3\,ja, 1\,nein)$

$H(S_{gut}) = -\frac{4}{5}\log_2(\frac{4}{5}) - \frac{1}{5}\log_2(\frac{1}{5}) \approx 0{,}7219$

$H(S_{mittel}) = -\frac{1}{2}\log_2(\frac{1}{2}) - \frac{1}{2}\log_2(\frac{1}{2}) \approx 1$

$H(S_{schlecht}) = -\frac{3}{4}\log_2(\frac{3}{4}) - \frac{1}{4}\log_2(\frac{1}{4}) \approx 0{,}8113$

$G(S, Wissen) = H(S) - \frac{|S_{gut}|}{|S|} H(S_{gut}) - \frac{|S_{mittel}|}{|S|} H(S_{mittel}) - \frac{|S_{schlecht}|}{|S|} H(S_{schlecht})$

$\approx 0{,}8454 - \frac{5}{11} \cdot 0{,}7219 - \frac{2}{11} \cdot 1 - \frac{4}{11} \cdot 0{,}8113$

$\approx$ ~~0,0404023~~ $0{,}04043$

Lust

$G(S, Lust) = H(S) - \frac{|S_{geht}|}{|S|} \cdot H(S_{geht}) - \frac{|S_{nein}|}{|S|} H(S_{nein})$

$= 0{,}8454 - \frac{7}{11} \cdot \underbrace{\left(-\frac{6}{7}\right) \cdot \log_2\left(\frac{6}{7}\right) - \left(-\frac{1}{7}\right)\log_2\left(\frac{1}{7}\right)}_{H(S_{geht})}$

$|S_{geht}| = 7$, $|S_{nein}| = 4$

$- \frac{4}{11} \underbrace{\left(-\frac{2}{4}\log_2\left(\frac{2}{4}\right) - \frac{2}{4}\log_2\left(\frac{2}{4}\right)\right)}_{H(S_{nein}) = 1}$

$\approx 0{,}37797$

Deadline

$G(S, Deadline) = H(S) - \frac{|S_{\geq 2}|}{|S|} H(S_{\geq 2}) - \frac{|S_{<2}|}{|S|} H(S_{<2})$

$|S_{\geq 2}| = 6$, $|S_{<2}| = 5$

$= 0{,}8454 - \frac{6}{11}\underbrace{\left(-\frac{5}{6}\log_2\left(\frac{5}{6}\right) - \frac{1}{6}\log_2\left(\frac{1}{6}\right)\right)}_{H(S_{\geq 2})}$

$- \frac{5}{11}\underbrace{\left(-\frac{3}{5}\log_2\left(\frac{3}{5}\right) - \frac{2}{5}\log_2\left(\frac{2}{5}\right)\right)}_{H(S_{<2})}$

$\approx 0{,}3846$

R & M

$G(S, R\&M) = H(S) - \frac{|S_{M,F}|}{|S|} H(S_{M,F}) - \frac{|S_{weiß}|}{|S|} H(S_{weiß})$

$|S_{M,F}| = 6$, $|S_{weiß}| = 5$

$= 0{,}8454 - \frac{6}{11}\underbrace{\left(-\frac{3}{6}\log_2\left(\frac{3}{6}\right) - \frac{3}{6}\log_2\left(\frac{3}{6}\right)\right)}_{H(S_{M,F}) = 1}$

$- \frac{5}{11}\underbrace{\left(1 \cdot \lg 1 - \ldots\right)}_{H(S_{weiß}) = 0}$

$\approx 0{,}2911$