

# EXERCÍCIO: Aula Shannon-Fano

$U^3 \rightarrow$  extensão de ordem  $n=3$  :

$k=2$  e  $n=3 \Rightarrow 2^3 = 8$  símbolos na fonte  $U^3$

$$P(S_1) = 3/4$$

$$P(S_2) = 1/4$$

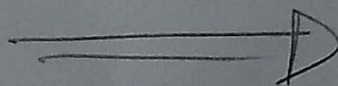
$U^3$	Probabilidade
$S_1 S_1 S_1$	$(3/4)^3 = 27/64 \rightarrow \sigma_1$
$S_1 S_1 S_2$	$(3/4)^2 \times (1/4) = 9/64 \rightarrow \sigma_2$
$S_1 S_2 S_1$	$(3/4)^2 \times (1/4) = 9/64 \rightarrow \sigma_3$
$S_2 S_1 S_1$	$(3/4)^2 \times (1/4) = 9/64 \rightarrow \sigma_4$
$S_2 S_2 S_1$	$(1/4)^2 \times (3/4) = 3/64 \rightarrow \sigma_5$
$S_2 S_1 S_2$	$(1/4)^2 \times (3/4) = 3/64 \rightarrow \sigma_6$
$S_1 S_2 S_2$	$(1/4)^2 \times (3/4) = 3/64 \rightarrow \sigma_7$
$S_2 S_2 S_2$	$(1/4)^3 = 1/64 \rightarrow \sigma_8$

$$H(U^3) = 3 \times H(U) = 3 \times 0,811 = \underline{\underline{2,433}}$$

$$L_3 = ?$$

$$\eta = \frac{n \times H(U)}{L_n} \Rightarrow \eta = \frac{H(U^3)}{L_3} = ?$$

\* Vamos construir o código de Shannon-Fano para  $U^3$  :



$\sigma_1$	$27/64$	0	0		$v_1 = 00$ ✓
$\sigma_2$	$9/64$	1			$v_2 = 01$ ✓
$\sigma_3$	$9/64$	0	0		$v_3 = 100$ ✓
$\sigma_4$	$9/64$	0	1		$v_4 = 101$ ✓
$\sigma_5$	$3/64$	1	0	0	$v_5 = 1100$ ✓
$\sigma_6$	$3/64$		0	1	$v_6 = 1101$ ✓
$\sigma_7$	$3/64$	1	1	0	$v_7 = 1110$ ✓
$\sigma_8$	$1/64$		1	1	$v_8 = 1111$

$$L_3 = 2 \times \frac{27}{64} + 2 \times \frac{9}{64} + 2 \times \left[ 3 \times \frac{9}{64} \right] + 3 \times \left[ 4 \times \frac{3}{64} \right] + 4 \times \frac{1}{64} = \frac{83}{32} = 2,59375$$

$$\text{Logo: } \eta = \frac{H(V^3)}{L_3} = \frac{2,433}{2,59375} = 0,9380 \times 100\% = \underline{\underline{93,80\%}}$$