a) Must have quantization error SNR of at least 10dB
\[ 3 \cdot 2^B \geq 100 \quad \text{or} \quad 2^B \geq 33 \quad \Rightarrow \quad B = 3 \]

b) Capacity = \( 6 \times 10^4 \log_2 (1 + 10) \) bits/s [minimum]
\[ = 21 \text{ Mbps} \]

Data rate: \( 1035 \times 10^4 \times 30 \times 3 \times 3 = 514.2 \text{ Mbps} \). Need to compress by a factor of \( \frac{21}{514.2} \approx \frac{1}{25} \). Now wonder it took so long to develop HDTV!