EX. 1 — 4/7/2018

c) Hamming code $N = 127$

$N = 2^{N-k} - 1 \rightarrow 128 = 2^{127-k}$

$127 - k = 7 \rightarrow \boxed{k = 120}$

$R = 120/127$ $\quad \boxed{dmin = 3} \rightarrow$ Hamming

SOFT

$$p(E) \leq Q\left(\sqrt{\frac{2E_b}{N_0} \cdot R \cdot d}\right)$$

$$\leq Q\left(\sqrt{\frac{2E_b}{N_0} \cdot \frac{120}{127} \cdot 3}\right)$$

HARD

$$t = \left\lfloor \frac{dmin - 1}{2} \right\rfloor = \boxed{1}$$

$$p(E) = \sum_{h=t+1}^{N} \binom{N}{h} \varepsilon^h \cdot (1-\varepsilon)^{N-h} \qquad \varepsilon = Q\left(\sqrt{\frac{2E_b}{N_0} \cdot R}\right)$$

$$\leq Q\left(\sqrt{\frac{2E_b}{T_0} \cdot R \cdot (t+1)}\right) \quad = Q\left(\sqrt{\frac{2E_b}{N_0} \cdot \frac{120}{127} \cdot 2}\right)$$