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$$x(t) = 3 \cos(600\pi t) + 2 \cos(1800\pi t)$$

bps = 10.000 bit/s ; L = 1024

a. $L = 2^b$

$1024 = 2^b$

$b = 10 \text{ bit}$

$$F_s = \frac{bps}{b} = \frac{10.000}{10} = 1000 \text{ Hz}$$

$$F_o = \frac{F_s}{2} = \frac{1000}{2} = 500 \text{ Hz}$$

b. $F_1 = 300 \text{ Hz}$ $F_2 = 900 \text{ Hz}$

$$F_N = 2 F_{max} = 2 \cdot F_2 = 2 \cdot 900 = 1800 \text{ Hz}$$

c. $$X(n) = 3 \cos\left(2\pi \frac{300}{1000} n\right) + 2 \cos\left(2\pi \cdot \frac{900}{1000} n\right)$$

$$= 3 \cos(2\pi \cdot 0,3n) + 2 \cos(2\pi \cdot 0,9n)$$

$$= 3 \cos(2\pi \cdot 0,3n) + 2 \cos(2\pi (1-0,1)n)$$

$$= 3 \cos(2\pi \cdot 0,3n) + 2 \cos(2\pi \cdot 0,1n)$$

$f_1 = 0,3 \rightarrow F_1 = f_1 \cdot F_s = 0,3 \cdot 1000 = 300 \text{ Hz}$

$f_2 = 0,1 \rightarrow F_2 = f_2 \cdot F_s = 0,1 \cdot 1000 = 100 \text{ Hz}$