1) Communications.

$T_s = 100ms$

The problem is that it does not represent the original signal.

At $f_s = 40Hz$, $T_s = \frac{1}{40} = 25ms$

This is all because the period is 25ms

This is all because the max frequency is

$f_m = 10Hz$, and by Nyquist theory we need to sample at 2x max to get back the original signal.

Thus the least acceptable sampling frequency

$f_s = 2 \times f_m = 20Hz$

is all because the period is 1 second

is all because the max frequency is

$f_m = 10\,Hz$, and by Nyquist theory we need to sample at 2x max to get back the original signal.

Thus the least acceptable sampling frequency

$f_s = 2 \times f_m = 20\,Hz$

20 40 60 80 100 120 140 160 180 200

look at picture

3) $\log_2(N) = K$

$\log_2(4) = 2$, so 2 bits

00 → 0.1
01 → -0.1
10 → 0.2
11 → -0.2

4) we the following bit sequence:

01, 01, 00, 10, 01, 11, 01

And the bit rate is $\frac{4}{T_s} = \frac{2}{25 \times 10^{-3}} = 80$ bits per second.

5) [redacted]

5) [redacted]

0, 1, 0, 1, 0, 0, 1, 0, 0, 1, 1, 1, 0, 1