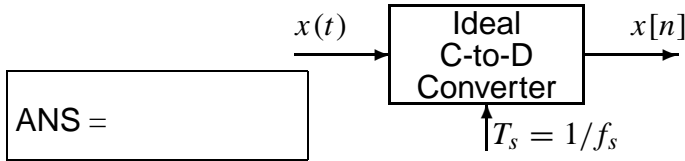


PROBLEM:

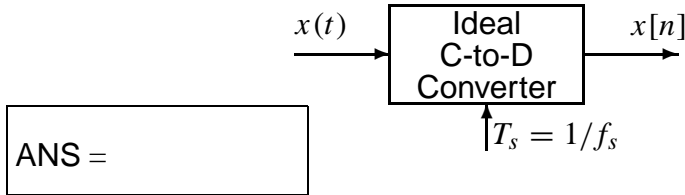
For each short question, pick a correct frequency and enter its letter in the answer box.

Note: Some questions might have more than one answer.

- (a) If the output from an ideal C/D converter is $x[n] = 1000 \cos(0.25\pi n)$, and the sampling rate is 8000 samples/sec, then determine one possible value of the input frequency of $x(t)$:



- (b) If the output from an ideal C/D converter is $x[n] = 1000 \cos(0.25\pi n)$, and the input signal $x(t)$ defined by: $x(t) = 1000 \cos(1800\pi t)$ then determine one possible value of the sampling frequency of the C-to-D converter:



- (c) Determine the Nyquist rate for sampling the signal $x(t)$ defined by: $x(t) = \Re\{e^{j4000\pi t} + e^{j3000\pi t}\}$.

ANS =

Frequency

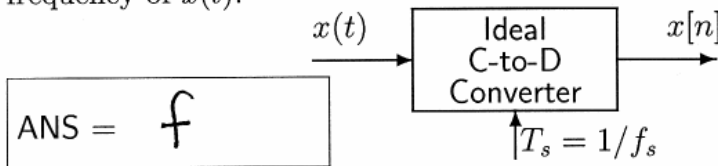
- (a) 8000 Hz
- (b) 4000 Hz
- (c) 2000 Hz
- (d) 1600 Hz
- (e) 1200 Hz
- (f) 1000 Hz
- (g) 800 Hz
- (h) 500 Hz
- (i) 400 Hz



For each short question, pick a correct frequency¹ and enter its letter in the answer box²:

Frequency

- (a) If the output from an ideal C/D converter is $x[n] = 1000 \cos(0.25\pi n)$, and the sampling rate is 8000 samples/sec, then determine one possible value of the input frequency of $x(t)$:

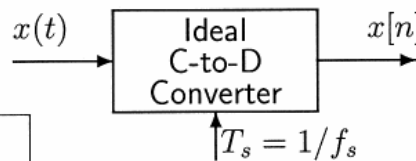


ANS = f

$$\frac{\pi}{4} = \frac{2\pi f}{8000} \Rightarrow f = \frac{\pi}{4} \cdot \frac{8000}{2\pi} = 1000$$

- (a) 8000 Hz
- (b) 4000 Hz
- (c) 2000 Hz
- (d) 1600 Hz
- (e) 1200 Hz
- (f) 1000 Hz
- (g) 800 Hz
- (h) 500 Hz
- (i) 400 Hz

- (b) If the output from an ideal C/D converter is $x[n] = 1000 \cos(0.25\pi n)$, and the input signal $x(t)$ defined by: $x(t) = 1000 \cos(1800\pi t)$ then determine one possible value of the sampling frequency of the C-to-D converter:



ANS = f_s

$$\pm \frac{\pi}{4} + 2\pi l = \frac{1800\pi}{f_s}$$

$$f_s = \frac{1800\pi}{\pi(2l \pm \frac{1}{4})} = \frac{7200}{8l+1}$$

- (c) Determine the Nyquist rate for sampling the signal $x(t)$ defined by: $x(t) = \Re\{e^{j4000\pi t} + e^{j3000\pi t}\}$.

ANS = b

$$f_{\max} = 2000 \text{ Hz}$$

$$f_s = 2f_{\max}$$

¹Some questions have more than one answer, but you only need to pick one correct answer from the list.

²It is possible to use an answer more than once.