COMP3721Assignment1

Jerry Xing

A01354731

Q1

(i) $s(t)$=−3sin(12t)

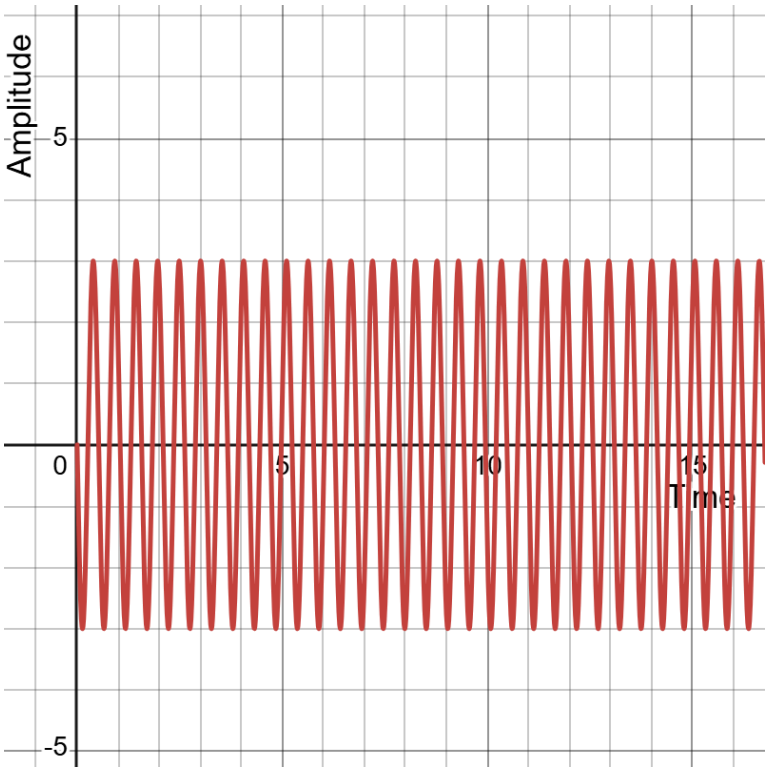
a.

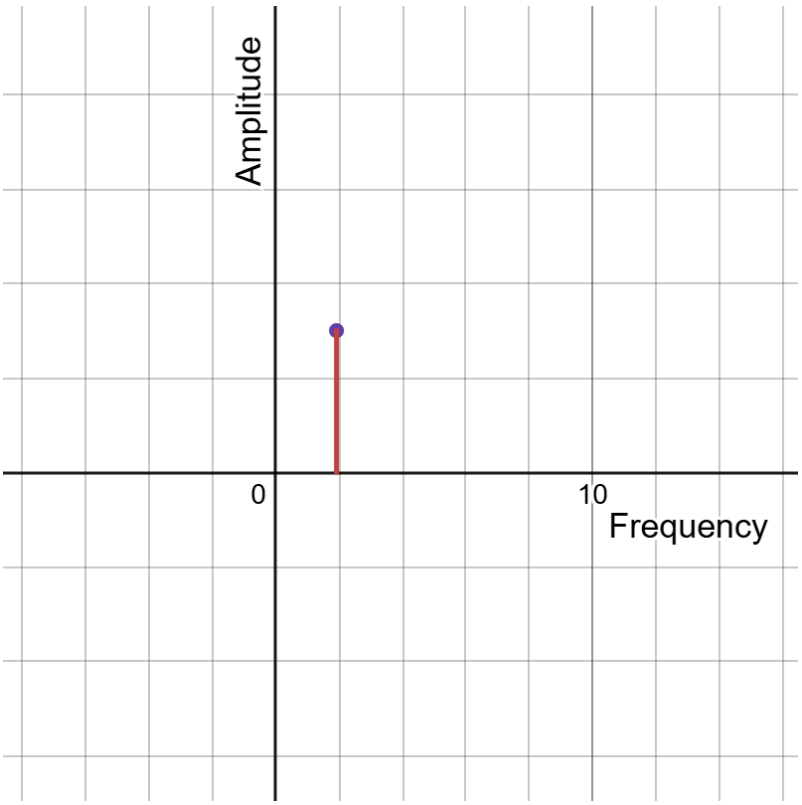
a.

$$A: A = -3V,$$
$$f: \quad 2\pi f = 12$$
$$f = \frac{12}{2\pi}$$
$$f \approx 1.91Hz$$
$$T: \quad T = \frac{1}{f} = \frac{\pi}{6} \approx 0.52s$$

$\therefore A = -3V, f \approx 1.91Hz, T \approx 0.52s$

b.





(ii) $s(t)$=4sin($3\pi t$)

a.

$$A: A = 4V,$$

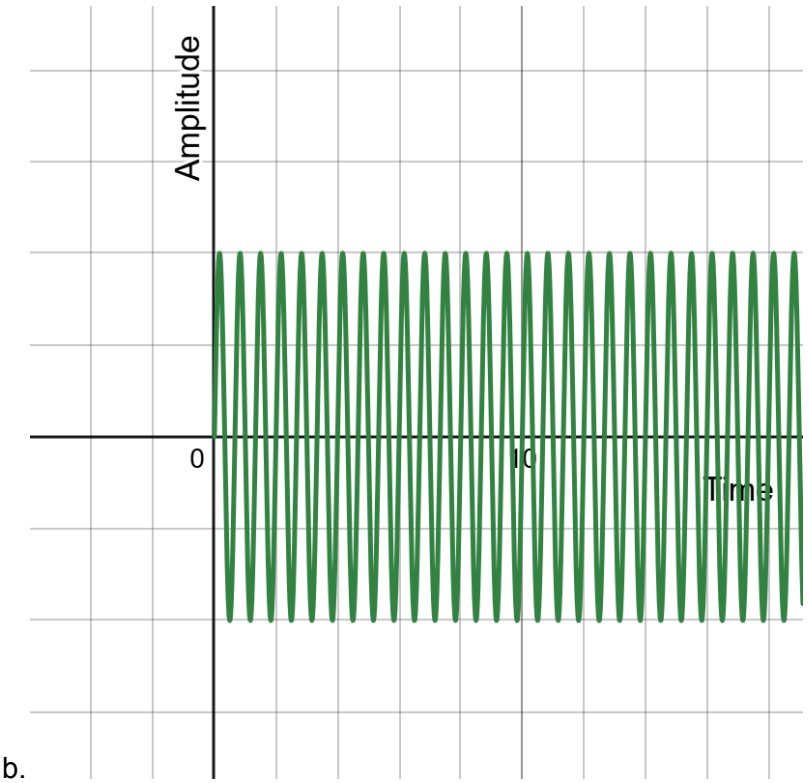
$$f: \quad 2\pi f = 3\pi$$

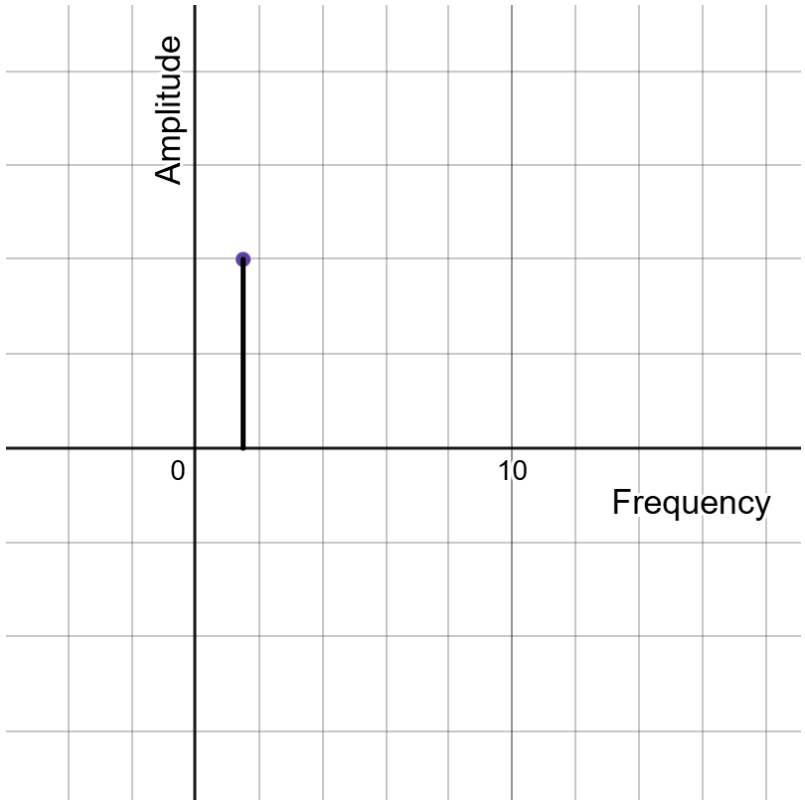
$$f = \frac{3}{2} = 1.5\,Hz$$

$$T: \quad T = \frac{1}{f} = \frac{2}{3} \approx 0.67s$$

$$\therefore A = 4V, f = 1.5Hz, T \approx 0.67s$$

b.





Q2

$$1\mu m \times 1000 = 1mm$$

Q3

a.

$$\begin{aligned} 1200 \times 1000 &= 1200000px \\ log_2 1024 &= 10bits/px \\ 1200000 \times 10 &= 12000000bits = 12Mb \end{aligned}$$

b.

$$\frac{12Mb}{1Mbps} \times 14 = 168s$$

Q4

A composite periodic signal can be decomposed into harmonic components using the Fourier series. Every composite periodic signal can be represented as a series of sine and cosine functions. The frequencies of these sine and cosine components are integer multiples of the fundamental frequency, and they are called harmonics.

Q5

Yes, because the frequency of a periodic signal is fixed, which means its frequency-domain plot has only a single peak line. In contrast, the frequency of a non-periodic function is not fixed.