Started on	Wednesday, 18 April 2018, 1:34 PM
State	Finished
Completed on	Wednesday, 18 April 2018, 2:00 PM
Time taken	25 mins 45 secs
Grade	**8.00** out of 10.00 (**80**%)

Question **1**

Correct

Mark 2.00 out of 2.00

Fourier series can also be used for a non-periodic function over some finite interval.

Select one:

- True ✓
- False

The correct answer is 'True'.

Question **2**

Correct

Mark 2.00 out of 2.00

In investigating the falling glass panels due to temperature fluctuations at NIP, you receive data on 3000 temperature observations taken at one hour intervals. On taking the DFT of your data, you see a single peak at the 133rd Fourier coefficient (c_{133}). From this peak, what is the estimated period (T) of temperature fluctuations in your data?

Select one:

- a. 26.08 hours
- b. 24.39 hours
- c. 22.55 hours ✓
- d. 23.62 hours

Your answer is correct.

$f = k/N$

$T = 1/f = N/k = 22.55$

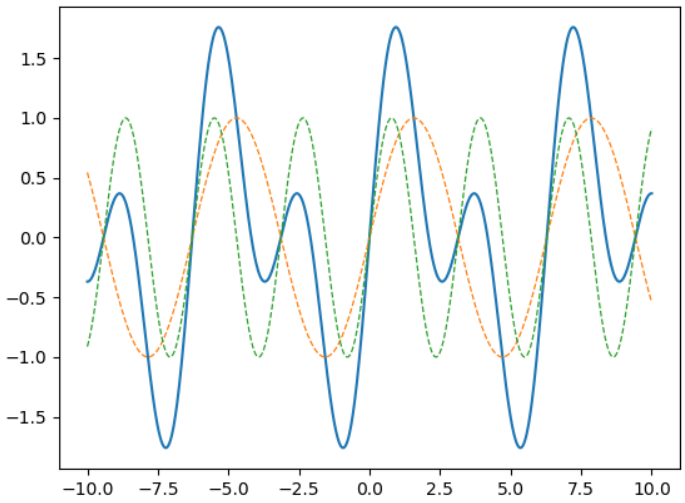
The correct answer is: 22.55 hours

Question **3**

Correct

Mark 2.00 out of 2.00

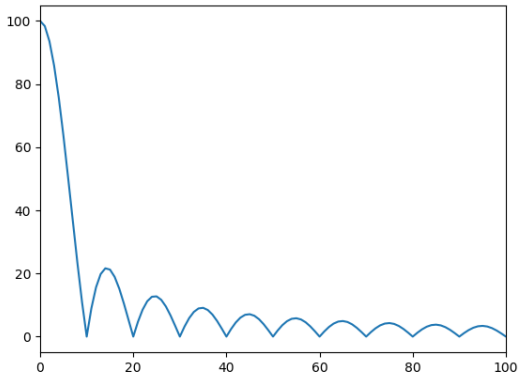
A complicated signal (solid line), sampled discretely, is created from the superposition of just two (2) pure sinusoidal signals of different frequencies (dashed lines).



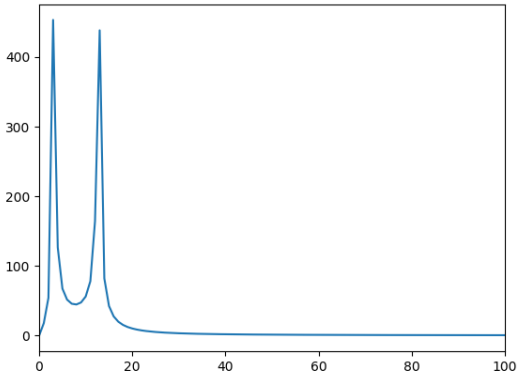
Which choice best represents what the real DFT magnitude of the complicated signal will look like?

Select one:

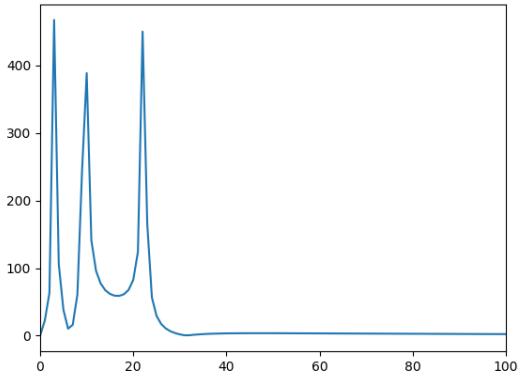
a.



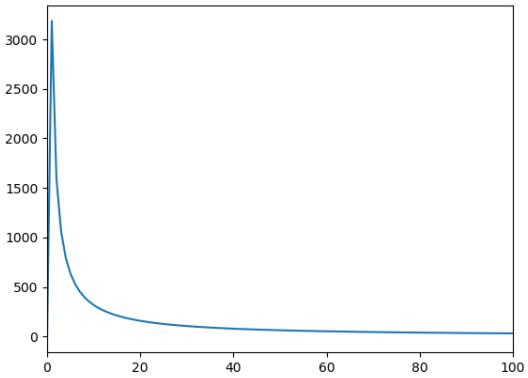
b.



c.



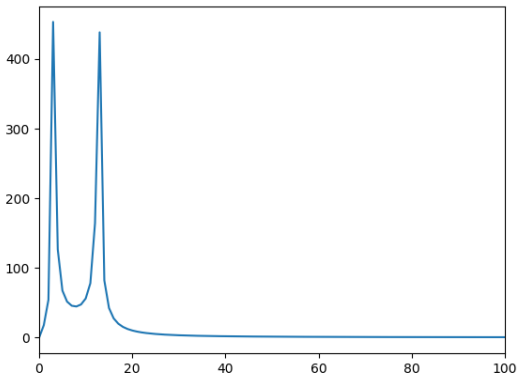
d.



Your answer is correct.

As the signal is a combination of only two sines, we should expect two prominent peaks at the bins corresponding to their respective frequencies.

The correct answer is:



Question **4**

Incorrect

Mark 0.00 out of 2.00

Consider taking the FFT of a 2.50-second sound recording of a trumpet playing note E5 (659.3 Hz), recorded at 44100 samples per second. At which k of Fourier coefficients c_k do you expect to see a prominent peak?

Select one:

- a. 1890 ✗
- b. 912
- c. 1307
- d. 1648

Your answer is incorrect.

N = 2.5(44100) = 110250 samples

f = 659.3 = k*44100/N = k/2.5

k ~ 1648

The correct answer is: 1648

Question **5**

Complete

Mark 2.00 out of 2.00

Give at least one real-world application of the DFT or DCT, and briefly explain how Fourier methods are used in that application.

One real-world application of the DFT is image deconvolution. This is the process of using Fourier analysis in resolving an image by removing its blurriness. First, the image is read and the point spread function is calculated. The Fourier transforms of these two get calculated and subsequently divided by the other. The inverse transform obtains the unblurred photo. All that's left to do is display the output.

Comment: