Homework for Module 3 Part 1

Quiz, 9 questions

Congratulations! You passed!

Next Item

1 / 1 points

1.
(Difficulty: ⋆) Write out the phase of the complex numbers $a_1 = 1 - \mathrm{j}$ and $a_2 = -1 - \mathrm{j}$.

Express the phase in degrees and separate the two phases by a single white space. Each phase should be a number in the range $[-180, 180]$.

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1 / 1 points

2.
(Difficulty: ⋆) Let $W_N^k = e^{-\mathrm{j}\frac{2\pi}{N}k}$ and $N > 1$. Then $W_N^{N/2}$ is equal to...

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1 / 1 points

3.
(Difficulty: ⋆) Which of the following signals (continuous- and discrete-time) are periodic signals?

Note that $t \in \mathbb{R}$ and $n \in \mathbb{Z}$.

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2 / 2 points

4.
(Difficulty: ⋆ ⋆ ⋆) Choose the correct statements from the choices below.

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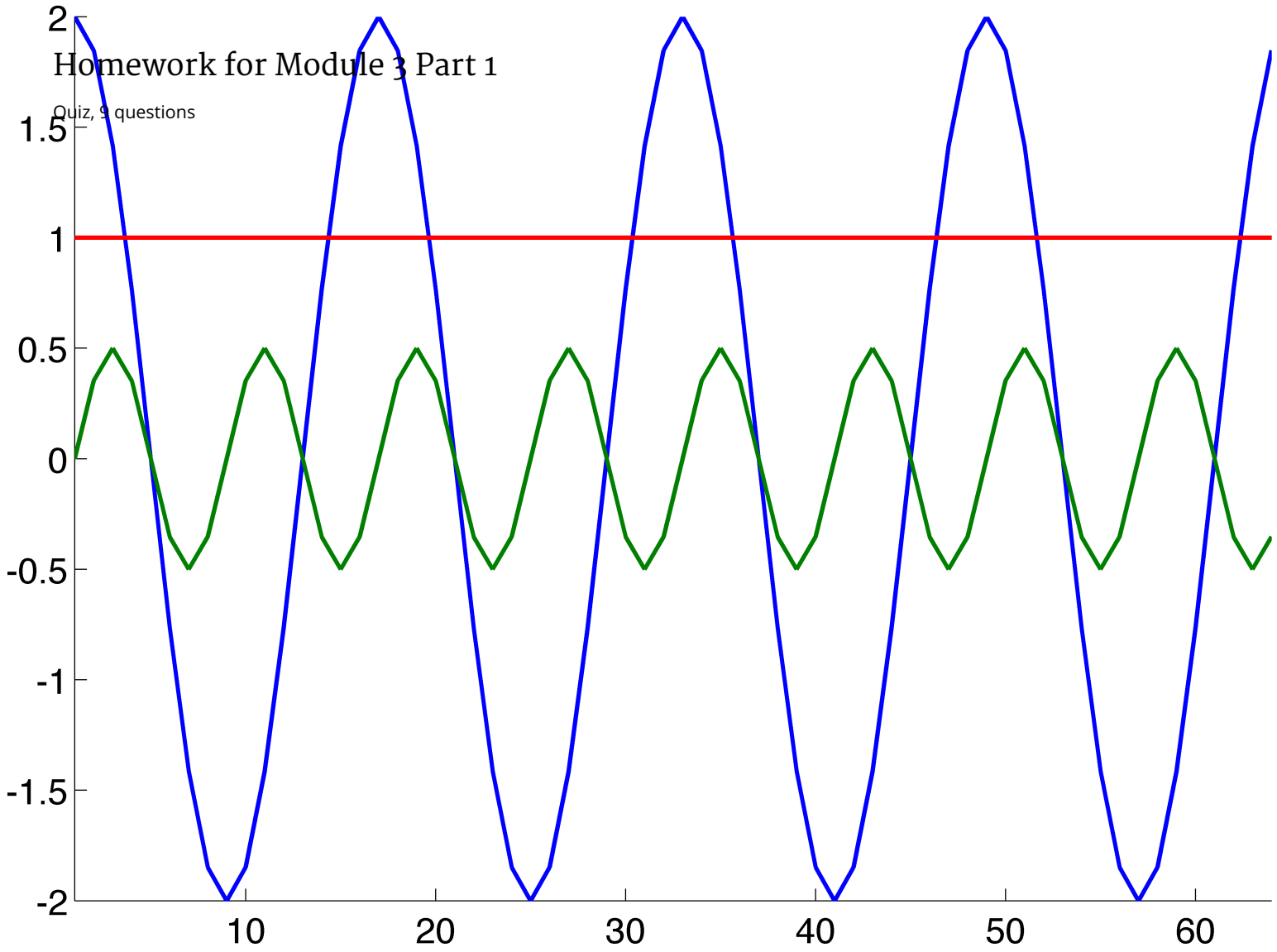
1 / 1 points

5.
(Difficulty: ⋆) Consider the Fourier basis $\{\mathbf{w}^k\}_{k=0,\ldots,N-1}$, where $\mathbf{w}^k[n] = e^{-j\frac{2\pi}{N}nk}$ for $0 \leq n \leq N-1$.

Select the correct statement below.

0.75 / 1 points

6.



(Difficulty: ⋆⋆) Consider the three sinusoids of length $N = 64$ as illustrated in the above figure; note that the signal values are shown from $n = 0$ to $n = 63$.

Call $y_1[n]$ the blue signal, $y_2[n]$ the green and $y_3[n]$ the red. Further, define $x[n] = y_1[n] + y_2[n] + y_3[n]$.

Choose the correct statements from the list below. Note that the capital letters indicate the DFT vectors.

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1 / 1 points

7.
(Difficulty: ⋆ ⋆ ⋆) Consider the length-N signal

$x[n] = \cos\left(2\pi \frac{L}{M} n\right)$

where M and L are integer parameter with $0 < L \leq N - 1, 0 < M \leq N$.

Choose the correct statements among the choices below.

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1 / 1 points

8.
(Difficulty: ⋆) Consider an orthogonal basis $\{\phi_i\}_{i=0,\ldots,N-1}$ for $\mathbb{R}^N$. Select the statements that hold for any vector $\mathbf{x} \in \mathbb{R}^N$.

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1 / 1 points

9.
(Difficulty: ⋆⋆) Pick the correct sentence(s) among the following ones regarding the DFT $\mathbf{X}$ of a signal $\mathbf{x}$ of length N, where N is odd.

Remember the following definitions for an arbitrary signal (asterisk denotes conjugation):

hermitian-symmetry: $x[0]$ real and $x[n] = x[N - n]^*$ for $n = 1, \ldots, N - 1$.

hermitian-antisymmetry: $x[0] = 0$ and $x[n] = -x[N - n]^*$ for $n = 1, \ldots, N - 1$.

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