Multiple Choice Test

Chapter 11.04
Discrete Fourier Transform

1. Given that \( W = e^{-\left( \frac{2\pi}{N} \right)} \), where \( N = 3 \). Then \( F = W^N \) can be computed as \( F = \)
   (A) 0
   (B) 1
   (C) \(-1\)
   (D) \(e\)

2. Given that \( W = e^{-\left( \frac{2\pi}{N} \right)} \), where \( N = 3 \). \( F = W^{\frac{N}{2}} \) can be computed as \( F = \)
   (A) 0
   (B) 1
   (C) \(-1\)
   (D) \(e\)

3. Given that \( N = 2 \), \( \{f\} = \{4 - 6i, -2 + 4i\} \). The values for vector \( \{\tilde{C}^R\} \) shown in
   \( \tilde{C}^R = \sum_{k=0}^{N-1} \{f^R(k) \cos(\theta) + f^I(k) \sin(\theta)\} \)
   can be computed as:
   (A) \(\begin{bmatrix} -2 \\ -6 \end{bmatrix}\)
   (B) \(\begin{bmatrix} -2 \\ 6 \end{bmatrix}\)
   (C) \(\begin{bmatrix} 2 \\ -6 \end{bmatrix}\)
   (D) \(\begin{bmatrix} 2 \\ 6 \end{bmatrix}\)
4. Given that $N = 2$, $\{f_i\} = \left\{ \frac{4 - 6i}{2 + 4i} \right\}$. The values for $\{\tilde{C}_i\}$ shown in Equation (22D)

$$\tilde{C}_n = \sum_{k=0}^{N-1} \left\{ f^I(k) \cos(\theta) - f^R(k) \sin(\theta) \right\}$$

can be computed as

(A) $\begin{bmatrix} -2 \\ -10 \end{bmatrix}$
(B) $\begin{bmatrix} -1 \\ -10 \end{bmatrix}$
(C) $\begin{bmatrix} -2 \\ -5 \end{bmatrix}$
(D) $\begin{bmatrix} -1 \\ -5 \end{bmatrix}$

5. If the forcing function $F(t)$ is given as $F(t) = \sum_{n=0}^{7} 10 \times \sin(2\pi nt)$. Then, to avoid aliasing phenomenon, the minimum number of sample data points $N_{\text{min}}$ should be

- (A) 8
- (B) 16
- (C) 24
- (D) 32

6. Based on the figure below, aliasing phenomena will not occur because there were

(A) 2 sample data points per cycle.
(B) 4 sample data points per cycle.
(C) 4 sample data points per 2 cycles.
(D) 6 sample data points per 2 cycles.