3) Let $A = \begin{bmatrix} 1+i & 1 \\ 1 & 1-i \end{bmatrix}$. Then A^{-1} is given by

A. $\begin{bmatrix} 1+i & 1 \\ 1 & 1-i \end{bmatrix}$

B. $\begin{bmatrix} 1-i & -1 \\ -1 & 1+i \end{bmatrix}$

C. $\begin{bmatrix} (1+i)/2 & 1/2 \\ 1/2 & (1-i)/2 \end{bmatrix}$

D. $\begin{bmatrix} 1-i & 1 \\ 1 & 1+i \end{bmatrix}$

E. A^{-1} does not exist.

5.3

(24) Let $\mathbf{u}$ and $\mathbf{v}$ be orthogonal vectors in $\mathbf{R}^5$ such that $||\mathbf{u}|| = \sqrt{7}$, $||\mathbf{v}|| = 3$. Then $||2\mathbf{u} - \mathbf{v}||$ equals

$(2u - v \quad , 2u - v)$

$= 4u \cdot u + v \cdot v = 4 \cdot 7 + 9 = 37$

A. $\sqrt{19}$

B. $\sqrt{23}$

C. 5

D. $\sqrt{37}$

E. 6

5.3

13. Let $C[-\pi, \pi]$ be the real vector space of continuous functions defined on $[-\pi, \pi]$. Define an inner product on $C[-\pi, \pi]$ by

$$\langle f, g \rangle = \int_{-\pi}^{\pi} f(t)g(t)dt.$$

Then which of the following set of vectors are orthogonal?

A. $1, t, t^2$
B. $\sin^2 t, 1, \cos t$
C. $1, e^t, e^{2t}$
D. $1, t, t^2 - \frac{\pi^2}{3},$
E. None of the above

14. Let A be an $n \times n$ matrix, which of the following statements is FALSE?

A. If A is a symmetric matrix, then A^T is also symmetric.
B. The product AA^T is always symmetric.
C. If A is skew symmetric, then A^3 is symmetric.
D. If A is symmetric, then $A + A^2$ is symmetric.
E. The sum $A + A^T$ is always symmetric.

15. A and B are $n \times n$ invertible matrices, which of the following statements is FALSE?

A. $(A^2)^{-1} = (A^{-1})^2$
B. $(A^{-1})^T = (A^T)^{-1}$.
C. $(AB^{-1})^{-1} = BA^{-1}$.
D. $(A + B^{-1})^{-1} = A^{-1} + B$.
E. $(aA)^{-1} = \frac{1}{a}A^{-1}$ for any nonzero real number a.