Linear Algebra: show what you know! (Sep 8th)

Name: _____

1. Is the value $[\ 5.2 \quad 6.3 \quad \pi \quad 4.9\ ]$ a vector or a scalar? *vector*

2. What is the result of the following operations? If an operation is impossible or undefined, simply write "***u cant do dat***" instead of giving a mathematical answer.

   (a) $\begin{bmatrix}4 & -1 & 1\end{bmatrix} + \begin{bmatrix}0 & 2 & 3\end{bmatrix}$
   Answer: $\begin{bmatrix}\mathbf{4} & \mathbf{1} & \mathbf{4}\end{bmatrix}$

   (b) $\begin{bmatrix}2 & 2\end{bmatrix} \cdot \begin{bmatrix}9 & 1 & 6\end{bmatrix}$
   Answer: ***u cant do dat***

   (c) $8 \cdot \begin{bmatrix}2\\2\end{bmatrix}$
   Answer: $\begin{bmatrix}\mathbf{16}\\\mathbf{16}\end{bmatrix}$

   (d) $\begin{bmatrix}3\\3\end{bmatrix} + \begin{bmatrix}6 & 9 & 2\end{bmatrix}$
   Answer: ***u*** cant do dat

   (e) $\begin{bmatrix}3 & 1\end{bmatrix} - \begin{bmatrix}1 & 3\end{bmatrix}$
   Answer: $\begin{bmatrix}\mathbf{2} & \mathbf{-2}\end{bmatrix}$

   (f) $\begin{bmatrix}36 & 0 & 0 & 0 & 5 & 91\end{bmatrix} \cdot \begin{bmatrix}0 & 15 & 41 & 2 & 1 & 0\end{bmatrix}$
   Answer: **5**

3. In the following matrix:

   $$Q = \begin{bmatrix}17 & 3 & -14 & 12\\2 & 4 & 6 & 8\\9 & 9 & 9 & 9\end{bmatrix}$$

   what is the value of $Q_{1,2}$? **6**

4. Using the value of Q above, and letting V be equal to:

   $V = \begin{bmatrix}0 & 1 & 1 & 0\end{bmatrix}$,

   what is the value of:

   (a) $Q \cdot V$? (or "***cant do dat***")
   Answer: ***cant do dat***

(b) $Q \cdot V^\intercal$? (or "*cant do dat*")

Answer: $Q \cdot V^\intercal = \begin{bmatrix} 17 & 3 & -14 & 12 \\ 2 & 4 & 6 & 8 \\ 9 & 9 & 9 & 9 \end{bmatrix} \cdot \begin{bmatrix} 0 \\ 1 \\ 1 \\ 0 \end{bmatrix} = \begin{bmatrix} -11 \\ 10 \\ 18 \end{bmatrix}$.

5. Which of the following matrices are *symmetric*? **Circle** all the ones that are.

$\boxed{\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}}$ $\quad \begin{bmatrix} 1 & 2 & 1 \\ 3 & 4 & 3 \\ 5 & 6 & 5 \end{bmatrix}$ $\quad \boxed{\begin{bmatrix} 4 & 4 & 4 \\ 4 & 4 & 4 \\ 4 & 4 & 4 \end{bmatrix}}$ $\quad \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 1 & 2 & 3 \end{bmatrix}$