1. (1 point) Find the dot product of

$$x = \begin{bmatrix} -5 \\ -5 \\ 3 \end{bmatrix} \text{ and } y = \begin{bmatrix} 5 \\ -2 \\ 2 \end{bmatrix}.$$

$x \cdot y =$ _____.

Answer(s) submitted:

- •

(incorrect)

2. (1 point) Find a non-zero vector v perpendicular to the vector $u = \begin{bmatrix} 5 \\ -6 \end{bmatrix}$.

$$v = \begin{bmatrix} \_ \\ \_ \end{bmatrix}$$

Answer(s) submitted:

- •

(incorrect)

3. (1 point) Find $a \cdot b$ if $\|a\| = 1$, $\|b\| = 9$, and the angle between a and b is $\frac{\pi}{2}$ radians.

$a \cdot b =$ _____

Answer(s) submitted:

- •

(incorrect)

4. (1 point) Compute the orthogonal projection of $v = \begin{bmatrix} -6 \\ 9 \\ -6 \end{bmatrix}$ onto the line L through $\begin{bmatrix} 3 \\ -4 \\ 3 \end{bmatrix}$ and the origin.

$$\text{proj}_L(v) = \begin{bmatrix} \_ \\ \_ \\ \_ \end{bmatrix}.$$

Answer(s) submitted:

- •

(incorrect)

5. (1 point) Let $y = \begin{bmatrix} -10 \\ 1 \\ -5 \end{bmatrix}$ and $u = \begin{bmatrix} 2 \\ 2 \\ 3 \end{bmatrix}$. Compute the distance d from y to the straight line through u and the origin.

$d =$ _____

Answer(s) submitted:

- •

(incorrect)

6. (1 point) Find the value of k for which the vectors

$$\begin{bmatrix} 0 \\ -4 \\ -4 \\ -3 \end{bmatrix} \text{ and } \begin{bmatrix} -1 \\ -1 \\ -2 \\ k \end{bmatrix}$$

are orthogonal.

$k =$ _____

Answer(s) submitted:

- •

(incorrect)

7. (1 point) Solve the system.

$$\begin{cases} 5x & - & 6y & = & 1 \\ -3x & - & 5y & = & -5 \end{cases}$$

$x =$ _____
$y =$ _____

Answer(s) submitted:

- •
- •

(incorrect)

8. (1 point) Given the augmented matrix

$$A = \begin{bmatrix} 1 & 2 & -6 & -3 \\ 4 & 9 & 5 & 1 \\ -4 & -10 & 4 & 1 \end{bmatrix},$$

perform each row operation in the order specified and enter the final result.

First: $R2 \rightarrow R2 - 4R1$,
Second: $R3 \rightarrow R3 + 4R1$,
Third: $R3 \rightarrow R3 + 2R2$.

$$\begin{bmatrix} \_ & \_ & \_ & \_ \\ \_ & \_ & \_ & \_ \\ \_ & \_ & \_ & \_ \end{bmatrix}$$

Answer(s) submitted:

- •

(incorrect)

9. (1 point) A dietitian is planning a meal that supplies certain quantities of vitamin C, calcium, and magnesium. Three foods will be used, their quantities measured in milligrams. The nutrients supplied by one unit of each food and the dietary requirements are given in the table below.

Nutrient	Food 1	Food 2	Food 3	Total Required (mg)
Vitamin C	20	40	30	335
Calcium	10	40	35	317.5
Magnesium	20	60	40	440

Write the augmented matrix for this problem.

$$\begin{bmatrix} \_ & \_ & \_ & \_ \\ \_ & \_ & \_ & \_ \\ \_ & \_ & \_ & \_ \end{bmatrix}$$

What quantity (in units) of Food 1 is necesary to meet the dietary requirements?

_____

What quantity (in units) of Food 2 is necesary to meet the dietary requirements?

_____

What quantity (in units) of Food 3 is necesary to meet the dietary requirements?

_____

Answer(s) submitted:

- •
- •
- •

(incorrect)

10. (1 point) Determine whether the following matrices are in echelon form, reduced echelon form or not in echelon form.

Note: the definition of echelon form in the notes (Definition 3.8) does not agree with the one used here. Here, the first non-zero entry of a row does not have to be equal to 1. Such an entry is called a 'leading entry', instead of a 'leading 1'. In Definition 3.8 (2) and (3), replace 'leading 1' by 'leading entry'.

The definition of reduced-row echelon form is the same as the one given in the notes. In particular, all leading entries must be leading 1s.

- • Choose
- • Echelon Form
- • Reduced Echelon Form
- • Not in Echelon Form

$$(1) \quad \begin{bmatrix} -10 & 1 & 1 \\ 1 & -3 & -10 \\ 0 & 0 & 1 \end{bmatrix}$$

- • Choose
- • Echelon Form
- • Reduced Echelon Form
- • Not in Echelon Form

$$(2) \quad \begin{bmatrix} 9 & 1 & 1 & 0 \\ 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 8 \end{bmatrix}$$

- • Choose
- • Echelon Form
- • Reduced Echelon Form
- • Not in Echelon Form

$$(3) \quad \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & -10 \end{bmatrix}$$

- • Choose
- • Echelon Form
- • Reduced Echelon Form
- • Not in Echelon Form

$$(4) \quad \begin{bmatrix} 0 & 1 & 0 & 10 \\ 0 & 0 & 1 & 5 \end{bmatrix}$$

Answer(s) submitted:

- •
- •
- •
- •

(incorrect)