HW

**HOMEWORK EXERCISES (TIME: 10 MINUTES)**

21. If $\begin{bmatrix} -x \\ y \end{bmatrix} + \begin{bmatrix} y \\ 2x \end{bmatrix} = \begin{bmatrix} x \\ 8 \end{bmatrix}$, then $x + y = ?$

(A) $-10$
(B) $-6$
(C) $-2$
(D) $2$
(E) $6$

22. By definition, the determinant $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ equals $ad - bc$. Find the value of $\begin{vmatrix} y & x^2 \\ -x^3 & y^3 \end{vmatrix}$ when $x = -2$ and $y = 3$.

(A) $-5$
(B) $22$
(C) $49$
(D) $59$
(E) $113$

23. If $A = [1 \quad 5 \quad -3]$ and $= \begin{bmatrix} 0 & -4 \\ 2 & 0 \\ 9 & 1 \end{bmatrix}$, then $A \times B = ?$

(A) $[-4 \quad 10 \quad -30]$
(B) $\begin{bmatrix} -4 \\ 10 \\ -30 \end{bmatrix}$
(C) $[-17 \quad -7]$
(D) $\begin{bmatrix} -17 \\ -7 \end{bmatrix}$
(E) The multiplication $A \times B$ cannot be performed.

24. If $[a \quad b \quad c] + [2 \quad 4 \quad 6] = [b \quad c \quad 2a]$, then $a + b + c = ?$

(A) 12
(B) 24
(C) 44
(D) 48
(E) 88

25. Evaluate the product $\begin{bmatrix} 12 & -3 & 2 \\ -1 & 0 & 7 \end{bmatrix} \times \begin{bmatrix} 4 \\ -4 \\ -3 \end{bmatrix}$.

(A) $\begin{bmatrix} 54 \\ -25 \end{bmatrix}$
(B) $\begin{bmatrix} -36 & 9 & -6 \\ 3 & 0 & -21 \end{bmatrix}$
(C) $\begin{bmatrix} 44 & -12 & 36 \\ -44 & 12 & -36 \\ -33 & 9 & -27 \end{bmatrix}$
(D) $\begin{bmatrix} 48 & 12 & -6 \\ -4 & 0 & -21 \end{bmatrix}$
(E) $\begin{bmatrix} 30 \\ 21 \end{bmatrix}$

26. If $\begin{bmatrix} 4 & -1 \\ 5 & 2 \end{bmatrix} \times \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 15 \\ 9 \end{bmatrix}$, then $(x, y) = ?$

(A) $(5, 3)$
(B) $(4, -1)$
(C) $(9, 1)$
(D) $(3, -3)$
(E) $(3, 7)$

27. If $x \neq 0, y \neq 0, A = \begin{bmatrix} x & 2x \\ -x & -2x \end{bmatrix}$ and $B = \begin{bmatrix} 2y & -y \\ 3y & -2y \end{bmatrix}$, then $\frac{1}{xy}(A \times B) = ?$

(A) $\begin{bmatrix} 15 & -9 \\ -15 & 9 \end{bmatrix}$
(B) $\begin{bmatrix} 0 & 2 \\ -1 & 1 \end{bmatrix}$
(C) $\begin{bmatrix} 3 & 6 \\ 5 & 10 \end{bmatrix}$
(D) $\begin{bmatrix} 8 & -5 \\ -8 & 5 \end{bmatrix}$
(E) The operation cannot be performed.

28. By definition, the determinant $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ equals $ad - bc$. If $\begin{vmatrix} a & -5a \\ 1 & a \end{vmatrix} = 6$, then:

(A) $a = 6$ or $a = -1$
(B) $a = 6$ only
(C) $a = -6$ or $a = 1$
(D) $a = -3$ only
(E) there are more than two possible values for $a$.

29. If $x \geq 0$, $y \geq 0$, $z \geq 0$, and $\begin{bmatrix} 2x & y \\ 2y & -x \\ 2z & x \end{bmatrix} \times \begin{bmatrix} x \\ -z \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$, then $(x, y, z) = ?$

(A) $(0, 1, 0)$
(B) $(1, 0.5, 0)$
(C) $(1, 2, 0)$
(D) $(0, 1, 1)$
(E) $(0, 0, 0)$

30. Jane has eight coins, all of which are dimes or quarters. Her eight coins are worth a total of \$1.55. Which of the following matrix equations is equivalent to a system of linear equations that can be solved to determine how many of each coin Jane has?

(A) $\begin{bmatrix} 0.10 & 1 \\ 0.25 & 1 \end{bmatrix} \times \begin{bmatrix} d \\ q \end{bmatrix} = \begin{bmatrix} 8 \\ 1.55 \end{bmatrix}$

(B) $\begin{bmatrix} 1 & 1 \\ 0.10 & 0.25 \end{bmatrix} \times \begin{bmatrix} 8 \\ 1.55 \end{bmatrix} = \begin{bmatrix} d \\ q \end{bmatrix}$

(C) $\begin{bmatrix} 0.10 & 0.25 \end{bmatrix} \times \begin{bmatrix} d \\ q \end{bmatrix} = 12.40$

(D) $\begin{bmatrix} 0.10 & 0.25 \\ 8 & 1.55 \end{bmatrix} \times \begin{bmatrix} d \\ q \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

(E) $\begin{bmatrix} 1 & 1 \\ 0.10 & 0.25 \end{bmatrix} \times \begin{bmatrix} d \\ q \end{bmatrix} = \begin{bmatrix} 8 \\ 1.55 \end{bmatrix}$