Date Completed: _____
Mentor Initials: _____

Matrices (Advanced)

1. For what value of x will the determinant of matrix $\begin{bmatrix} 3 & 2 \\ x & 6 \end{bmatrix}$ have a value of 24?

A. -6
B. -3
C. 3
D. 6
E. 9

2. Given $M = \begin{bmatrix} 7 & 2 \\ -2 & 0 \\ 5 & 1 \end{bmatrix}$, $N = \begin{bmatrix} 2 & -5 & 4 \\ 9 & 2 & -4 \end{bmatrix}$, and $O = \begin{bmatrix} 5 & 1 \\ -3 & -2 \end{bmatrix}$, if it is possible to calculate $NM + O$, which of the following matrices is the result?

A. $\begin{bmatrix} 49 & 9 \\ 36 & 12 \end{bmatrix}$
B. $\begin{bmatrix} 49 & 39 \\ 9 & 12 \end{bmatrix}$
C. $\begin{bmatrix} 12 & 9 \\ 39 & 49 \end{bmatrix}$
D. $\begin{bmatrix} 32 & -31 & 20 \\ -4 & 10 & -8 \\ 19 & -23 & 16 \end{bmatrix}$
E. It is not possible to calculate $NM + O$.

3 What is the matrix product $\begin{bmatrix} 3 & 7 \\ 6 & 2 \end{bmatrix}\begin{bmatrix} h & i \\ j & k \end{bmatrix}$?

A. $\begin{bmatrix} (3h + 7j) & (3i + 7k) \\ (6h + 2j) & (6i + 2k) \end{bmatrix}$
B. $\begin{bmatrix} (3h + 6i) & (7h + 2i) \\ (3j + 6k) & (7j + 2k) \end{bmatrix}$
C. $[(3h + 6j) \quad (7i + 2l)]$
D. $\begin{bmatrix} 3h & 7i \\ 6j & 2k \end{bmatrix}$
E. $\begin{bmatrix} (3h + 7i) \\ (6j + 2k) \end{bmatrix}$

4. The Zootopia Zoo contains 200 human babies, 600 adult females, and 400 adult males on display. The average number of Instagram pages viewed per day by human babies, adult females, and adult males is $3, 7,$ and 500, respectively. Which of the following matrix products yields the average total number of Instagram pages viewed per day by all the human babies, adult males, and adult females in the park?

A. $\begin{bmatrix}200\\600\\400\end{bmatrix}\begin{bmatrix}3\\7\\500\end{bmatrix}$

B. $\begin{bmatrix}200\\600\\400\end{bmatrix}\begin{bmatrix}3 & 7 & 500\end{bmatrix}$

C. $\begin{bmatrix}200\\400\\600\end{bmatrix}\begin{bmatrix}3 & 7 & 500\end{bmatrix}$

D. $\begin{bmatrix}200 & 600 & 400\end{bmatrix}\begin{bmatrix}3\\7\\500\end{bmatrix}$

E. $\begin{bmatrix}200 & 400 & 600\end{bmatrix}\begin{bmatrix}3\\7\\500\end{bmatrix}$

5. What is the determinant of the matrix shown below?

$$\begin{vmatrix}6 & -2\\1 & 3\end{vmatrix}$$

A. 20
B. 16
C. -1
D. -15
E. -46

6. Four matrices are given below.

$A = \begin{bmatrix}7 & 1 & 4\\2 & 3 & 5\end{bmatrix}$ $B = \begin{bmatrix}9 & 8\\6 & 3\\3 & 4\end{bmatrix}$ $C = \begin{bmatrix}5 & 6\\3 & 2\end{bmatrix}$ $D = \begin{bmatrix}1 & 3\\6 & 6\end{bmatrix}$

Which of the following matrix products is undefined?

A. CD
B. CA
C. AB
D. DC
E. DB

7. The table below shows the numbers of rows and columns in each of 5 matrices.

Matrix	Rows	Columns
A	j	k
B	j	j
C	m	k
D	j	m
E	k	j

For positive values of *j, k,* and *m,* which of the following matrix products is NOT possible?

A. AE
B. BD
C. CE
D. DC
E. CD

8. If the determinant of $\begin{bmatrix} w & x \\ y & z \end{bmatrix}$ is equal to $wz - xy$, then the determinant of $\begin{bmatrix} -z & -y \\ w & x \end{bmatrix}$ is equal to:

A. $wx + zy$
B. $wx - zy$
C. $zx + wy$
D. $-zx - wy$
E. $-zx + wy$

9. Ocean High School and River High School have decided that selected students will attend a daytime theatrical performance that costs \$8 for each teacher and \$4 for each student. 3 teachers and 12 students from Ocean High will attend, and one teacher and 27 students from River High will attend. Which of the following matrix products represents the ticket costs, in dollars, for each high school?

A. $\begin{bmatrix}8\\4\end{bmatrix}\begin{bmatrix}3 & 12\\1 & 27\end{bmatrix}$

B. $\begin{bmatrix}8\\4\end{bmatrix}\begin{bmatrix}3 & 1\\12 & 27\end{bmatrix}$

C. $\begin{bmatrix}8 & 4\end{bmatrix}\begin{bmatrix}3 & 1\\12 & 27\end{bmatrix}$

D. $\begin{bmatrix}8 & 4\end{bmatrix}\begin{bmatrix}3 & 12\\27 & 2\end{bmatrix}$

E. $\begin{bmatrix}8 & 4\end{bmatrix}\begin{bmatrix}3 & 12\\1 & 27\end{bmatrix}$

10. For what positive real value of l, if any, is the determinant of the matrix $\begin{bmatrix}l & 3\\2 & l\end{bmatrix}$ equal to $-l$?

(Note: The determinant of $\begin{bmatrix}a & b\\c & d\end{bmatrix}$ equals $ad - bc$.)

A. 2
B. 3
C. 6
D. $\sqrt{6}$
E. There is no such value of l.