I hereby state that the work on this exam is my own ________________________________

(signature required)

- Read all directions.
- PUT YOUR NAME, SECTION NUMBER AND VERSION B ON YOUR SCANTRON.
- The scantrons will not be returned, so mark your answers on this exam too.
- Write neatly.
- If you need scratch paper, ask for it. DO NOT use your own scratch paper.
- No partial credit on scantron questions.
- There are 3 pages. The back of the cover page is blank.
- There is a 5 point deduction for any errors in following the directions. This includes errors in your name, ID number, section number, missing signature and no version color or name on your scantron.
- There will be a deduction of 5 points for any hand grading of your scantron.

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EXAM PART I – Four Point Multiple Choice Questions: Answer these questions on the FRONT of your scantron.

1. The table shows \( x \), the number of danish supplied at a bakery at different prices, \( y \), in dollars. Using linear regression, determine the lowest price the bakery is willing to accept for danish.

<table>
<thead>
<tr>
<th>( x )</th>
<th>10</th>
<th>17</th>
<th>26</th>
<th>35</th>
<th>41</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>1.00</td>
<td>1.25</td>
<td>1.40</td>
<td>1.60</td>
<td>1.75</td>
</tr>
</tbody>
</table>

(A) $0.81   (B) $0.43   (C) $0.34   (D) $0.02   (E) none of the above

2. Matrix \( F \) shows the number of units of different building materials needed for the exterior of three different model homes. The builder is planning on building 31 model A homes, 26 model B homes and 15 model C homes. Find a matrix \( G \) such that when it is multiplied by \( F \) will give the total amount of each exterior material needed by the builder.

<table>
<thead>
<tr>
<th>( F )</th>
<th>brick</th>
<th>siding</th>
<th>shingles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model A</td>
<td>11</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Model B</td>
<td>3</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Model C</td>
<td>9</td>
<td>11</td>
<td>17</td>
</tr>
</tbody>
</table>

\( G \) = [31 26 15] (A) \( H = FG \), with \( G \) \( (B) H = GF \), with \( G \) \( (C) H = FG \), with \( G \) \( (D) H = GF \), with \( G \) \( (E) none of the above \)

3. What is the equation of the vertical line that passes through the point \((d, c)\)?

(A) \( y = c \)   (B) \( y = d \)   (C) \( x = d \)   (D) \( x = c \)   (E) none of the above

4. Matrix \( M \) shows the number of different planners in stock at a store at the beginning of March. There are three varieties of planners (plain, standard and deluxe) and three sizes (pocket, wall and desk). No new shipments arrive and matrix \( N \) shows the number of planners in stock at this same store at the end of the month. Matrix \( P \) shows the price of each size planner. What does the matrix \( Q = (M-N)P \) mean?

\[
\begin{array}{ccc}
\text{plain} & \text{standard} & \text{deluxe} \\
\text{pocket} & 13 & 8 & 4 \\
\text{wall} & 6 & 14 & 25 \\
\text{desk} & 12 & 15 & 9 \\
\end{array}
\quad
\begin{array}{ccc}
\text{pocket} & 3 & 2 & 1 \\
\text{wall} & 2 & 4 & 5 \\
\text{desk} & 2 & 5 & 1 \\
\end{array}
\quad
\begin{array}{c}
\text{plain} \quad 7 \\
\text{standard} \quad 12 \\
\text{deluxe} \quad 25 \\
\end{array}
\]

\( M \) \( N \) \( P \)

(A) The revenue from each size of planner sold in March  (B) The revenue from each variety of planner sold in March  (C) The number of each size of planner sold in March  (D) The number of each variety of planner sold in March  (E) none of the above

5. A store finds that it can sell 24 packages of collectible cards per day if the price is $5 per package. If the price is decreased by $1, the store will sell an additional 8 packages per day. Find the demand equation for these collectible cards and use it to determine the price the store should charge for a package of these collectible cards if the store wants to sell 50 packages per day.

(A) $0.13   (B) $1.75   (C) $2.50   (D) $8.00   (E) none of the above

6. Solve the following matrix equation for \( X \): \( XA + XB = C \)

\[
\begin{align*}
(A) \quad & \frac{C}{A - B} \\
(B) \quad & (A B)^T \\
(C) \quad & (A B)^T C \\
(D) \quad & \text{can’t be solved} \\
(E) \quad & \text{none of the above}
\end{align*}
\]
**Math 166 Exam 1**

**EXAM PART II – Two Point Multiple Choice Questions.** Answer questions 51 – 59 on the BACK of your scantron.

**Questions 51 - 56:** You are given information about the following matrices: \(E\) is 3x4, \(F\) is 4x3, \(G\) is 3x3, \(H\) is 4x4 (singular), \(I\) is 4x4 (identity matrix), \(J\) is 4x4 (non-singular). Check the following statements and choose the answer below the best fits each statement:

(A) Not possible  
(B) a 3x3 matrix  
(C) a 3x4 matrix  
(D) a 4x4 matrix  
(E) a 4x3 matrix

51. \(E \times F\)  
52. \(G \times F^T\)  
53. \(E \times H\)  
54. \(I \times H^{-1}\)  
55. \(E + F\)  
56. \(J^{-1}\)

**Questions 57 - 60:** Choose ALL correct responses for the given graph

(A) Revenue function  
(B) Profit function  
(C) Demand function  
(D) Supply function  
(E) none of these

57. Graph VI above could be a _____
58. Graph I above could be a _____
59. Graph III above could be a _____
60. Graph V above could be a _____

**EXAM PART III – Free Response Questions**

**Question 1 (4 points)** Find the values of \(w, x, y\) and \(z\) in the matrix equation:

\[
\begin{pmatrix} 4 & 5 & 1 & 0 \end{pmatrix} \begin{pmatrix} x \ 4 \ 4 \ 0 \end{pmatrix} + \begin{pmatrix} 5 \ 1 \ (z) \ 3 \end{pmatrix} (w \ 1) = 5
\]

\(w = _____ \quad x = _____ \quad y = _____ \quad z = _____

**Question 2 (10 points)** Using the graph below, find the exact value of the ALL corner points and CIRCLE the correct inequality symbols. The feasible region is in white.

Corners are at:

\(\begin{array}{c}
\begin{pmatrix} x \\ 2y \\ 0 \end{pmatrix} \\
\begin{pmatrix} 5x \\ 11y \\ 8 \end{pmatrix} \\
\begin{pmatrix} 4x \\ 3y \\ 12 \end{pmatrix}
\end{array}\)
Question 3 (8 points)

A company purchases a state-of-the-art phone system for $7000. It is depreciated linearly for 4 years and then sold for $1000. What is the rate of depreciation? Find and graph the depreciation equation.

Question 4 (4 points) What is the solution to the linear system shown in the augmented matrix

\[
\begin{pmatrix}
1 & 0 & 0 & | & 5 \\
0 & 1 & 0 & | & 0 \\
0 & 0 & 0 & | & 0
\end{pmatrix}
\]

Question 5 (7 points) Set up, but do not solve, the following problem:

A dietician wishes to design a meal for Sandy that will have her minimum daily requirements of Vitamin C, Vitamin A and copper. The dietician will use Foods A, B and C to make this meal. The table below shows how many units of each nutrient is found in each ounce of the foods. If Sandy needs 167 units of Vitamin C, 39 units of Vitamin A and 24 units of copper, how much of each food should she have in her meal?

<table>
<thead>
<tr>
<th></th>
<th>Vitamin C</th>
<th>Vitamin A</th>
<th>Copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food A</td>
<td>12</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Food B</td>
<td>3</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Food C</td>
<td>20</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>
**Question 6** (7 points) Find the solution to the following problem:

An investor has $5000 to invest in his IRA this year. His broker suggests investing in x dollars in a money market account, y dollars in bonds and z dollars in precious metals. To balance his portfolio, the broker suggests he has three times as much money in money market as in precious metals. The investor then has to decide how much to invest in each option. The equations for this problem are \( x+y+z = 5000 \) and \( x = 3z \). How much can the investor put into each of these options?

**Question 7** (5 points) A company makes and sells Valentine gift baskets. The company finds that the baskets cost an average of $30 each to make when they make 20 baskets. If they make 60 baskets then the average cost to make a basket is $20 each. Find the total cost for the company to make 120 baskets.

**Question 7** (6 points) A distributor has cordless phones to supply to the market according to the equation 
\[-9x+5p=3000\]
where \( p \) is the price in yen and \( x \) is the number of phones supplied in thousands. The consumers are willing to buy these phones according to the equation 
\[2x+7p=8200\]. Find and interpret the equilibrium point for these phones. (round to the nearest yen)

**Question 8** (5 points) Pivot on element \( a_{22} \) in matrix 
\[
\begin{pmatrix}
9 & 3 & 54 \\
6 & 4 & 12
\end{pmatrix}
\]. Show your work.