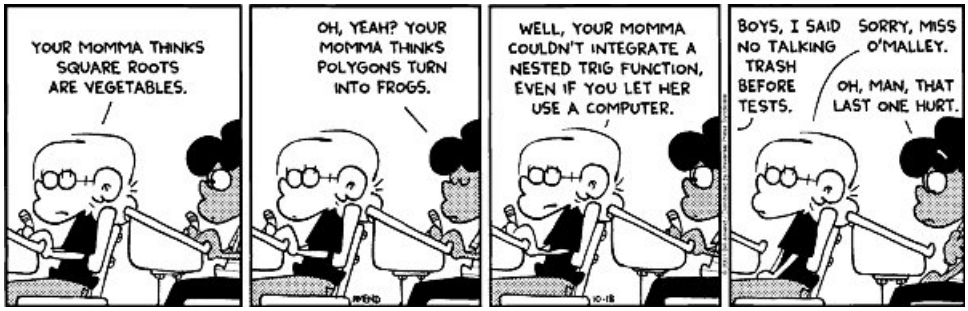

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LAST NAME:_____ FIRST NAME:_____

UIN: _____ EXAM SEAT NUMBER: _____

MY USUAL SEAT IS: _____

"An Aggie does not lie, cheat, or steal or tolerate those who do"

On my honor as an Aggie, I have neither given nor received unauthorized aid on this exam.

SIGNATURE:_____

- Read and follow all instructions and read each question carefully.
- Each question is worth 4.5 points, for a total of 99 points, plus one point for filling out the above and your Scantron form correctly.
- Fill in you Scantron form **last name first**. In the **Test No.** box fill in the exam version from the top right of this page. It is 1A, 1B, 1C or 1D for this exam.
- Mark the correct answer on your Scantron form, and on this exam. **Scantrons will not be returned.**
- You may not collaborate with your neighbors on this exam.
- The only things on your desk and in sight are pencils, erasers, calculator (without a case) student ID. Your student ID must be out on your desk. **No hats, no sunglasses, no wallets, no cellphones, no calculator cases.**
- Everything else should be put away in your backpack or bag and put underneath your desk. If you do not have a backpack or bag to stow things in, you must put your things at the front or back of the classroom, away from your desk. Mark answer (c) on your Scantron to question 51.
- In particular, your cellphone must be turned off and put away during this exam.
- GOOD LUCK!!!!!!!

1. The cost and profit functions, in dollars, for a business are given below where x represents the number of items sold. Find the break-even point.

   Cost: $C(x) = 10x + 360$
   Profit: $P(x) = 15x - 360$

   (a) (24, 600)
   (b) (24, 0)
   (c) (36, 180)
   (d) (48,0)
   (e) (48, 1200)

2. Find the number of solutions to the system of equations represented by this augmented matrix. The variables are indicated in the first row.

$$\left[\begin{array}{ccc|c} x & y & z & \\ 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

   (a) exactly one solution
   (b) exactly three solutions
   (c) exactly two solutions
   (d) no solution
   (e) infinitely many solutions

3. Use the variables defined below to write the equation that represents the following statement:

   "Jean Marie has three times as many math problems as Kathryn and Sherry have combined."

   x = the number of math problems Kathryn has
   y = the number of math problems Sherry has
   z = the number of math problems Jean Marie has

   (a) $z = 3(x + y)$
   (b) $3z = x + y$
   (c) $z = 3x + y$
   (d) $3z + y + z = 0$
   (e) None of these.

4. Perform the indicated row operations and give the resulting matrix.

$$\left[\begin{array}{ccc|c} 1 & 1 & 2 & -2 \\ 0 & 1 & -1 & 3 \\ 0 & -3 & 4 & -10 \end{array}\right]$$

$-R_2 + R_1 \to R_1$ then $3R_2 + R_3 \to R_3$

(a) $\left[\begin{array}{ccc|c} 1 & 0 & 3 & -5 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 1 & -1 \end{array}\right]$

(b) $\left[\begin{array}{ccc|c} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -1 \end{array}\right]$

(c) $\left[\begin{array}{ccc|c} 1 & 1 & 2 & -2 \\ 0 & 1 & -1 & 3 \\ 0 & 0 & 1 & -1 \end{array}\right]$

(d) $\left[\begin{array}{ccc|c} 1 & 0 & 3 & -5 \\ 0 & -3 & 3 & 9 \\ 0 & -6 & 7 & -1 \end{array}\right]$

(e) None of these.

5. Which of the following operations is **NOT** possible?

$$G = \begin{bmatrix} 1 & 2 \\ 1 & 5 \end{bmatrix} \qquad H = \begin{bmatrix} 1 & 2 & 4 & 5 \\ 0 & 2 & 4 & 1 \end{bmatrix} \qquad J = \begin{bmatrix} 1 \\ 2 \\ 4 \\ 7 \end{bmatrix} \qquad K = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$$

(a) GH^T

(b) GHJ

(c) $H^TK - J$

(d) $K^TG^{-1}H$

(e) All of these operations are possible.

6. Find c_{21} where $C = \begin{bmatrix} w & x \\ y & z \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

(a) $y + 3z$

(b) $2w + 4x$

(c) $3y$

(d) $4y$

(e) None of these.

7. An art collector bought a five year old sculpture for \$400. Ten years later the sculpture is worth \$1000. Assume that the value of the sculpture increases linearly. Find a linear equation that gives the value of the sculpture, where t is the age of the sculpture.

   (a) $y = 60t + 100$
   (b) $y = 0.0167t - 395$
   (c) $y = 60t + 395$
   (d) $y = 100t - 400$
   (e) $y = 100t + 400$

8. A university bookstore sells a packet of 5 Scantrons for \$1.75 per packet. The store purchases the packet for \$0.75 each. The bookstore manager finds that if she purchases and sells 450 packets in a month, then her monthly profit is \$100. Find the monthly cost function, $C(x)$, where x represents the number of packets of Scantrons.

   (a) $C(x) = 0.75x + 350$
   (b) $C(x) = 1.0x + 350$
   (c) $C(x) = 1.0x - 450$
   (d) $C(x) = 1.75x - 450$
   (e) $C(x) = 0.75x + 450$

9. Give the value(s) of k so that the following system of equations has exactly one solution.

$$\begin{aligned} 2x &+ 3y &&= 5 \\ 4x &+ ky &&= 6 \end{aligned}$$

   (a) $k \neq 6$
   (b) $k = 6$
   (c) $k = \frac{8}{3}$
   (d) $k \neq \frac{8}{3}$
   (e) There is no value of k for which this is true.

10. Solve for the variable z.

$$\begin{bmatrix} 6 & -8 & 3 \\ 4 & 5 & b \end{bmatrix}^T - 2 \begin{bmatrix} 1 & 8 \\ 4 & z+1 \\ y-1 & 9 \end{bmatrix} = 4 \begin{bmatrix} 1 & -3 \\ -4 & 6 \\ 7 & 2 \end{bmatrix}$$

$z =$

(a) -10.5
(b) -11.5
(c) -20
(d) 18
(e) Cannot be computed since matrices are not the correct size.

11. Solve this system of equations using any method taught in class, **then find** $x + y + z$**.**

$$\begin{array}{rcrcrcr} x & + & 2z & & & = & -3y + 6 \\ y & - & 2z & + & 2x & = & 3 \\ z & + & 3y & - & 2x & = & -19 \end{array}$$

$x + y + z =$

(a) 8
(b) $\dfrac{40}{3}$
(c) 4
(d) 6
(e) No solution.

12. The table below gives the average number of good books that I read during certain years.

Year (x)	2000	2002	2010	2011
books (y)	48	40	26	21

Compute the least squares (linear) regression line for this data, and predict the number of good books I will read in 2013. Round your answer to the nearest integer.

(a) 18 good books
(b) 15 good books
(c) 16 good books
(d) 17 good books
(e) 19 good books

Use the following supply and demand functions to answer questions 13 and 14 below; x is measured in hundreds of items and p is in dollars.

Demand: $20x + p - 195 = 0$
Supply: $-50x + 5p - 322.5 = 0$

13. Find the equilibrium price.

(a) \$108
(b) \$435
(c) \$1.08
(d) \$2
(e) \$4.35

14. Find the equilibrium quantity.

(a) 435 items
(b) 108 items
(c) 4.35 items
(d) 1.08 items
(e) 200 items

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15. You are determining the number of pizza sandwiches (x), turkey sandwiches (y), and vegetarian sandwiches (z) sold at Potbelly's Sandwich Shop on Wednesday. You know that there are a total of 230 sandwiches sold. Below is the matrix that the calculator returns gives after it has performed its magic. What values of z will give a valid solution for this problem.

$$\left[\begin{array}{ccc|c} x & y & z & \\ 1 & 0 & -1 & -50 \\ 0 & 1 & 2 & 280 \end{array}\right]$$

(a) $z = 50, 51, 52, \ldots, 140$
(b) $50 \leq z \leq 140$
(c) $z = 0, 1, 2, \ldots, 230$
(d) $z \geq 0$
(e) $z = 140, 141, \ldots, 230$

16. If an eBook reader is priced at \$220, then 55 sell. If the price decreases by \$70, then 255 sell. When the price is \$280 then producers are willing to provide 165 eBook readers. When the price is decreased by \$144, then they are willing to provide 75 eBook readers. Assume supply and demand are linear. Find the demand equation.

    (a) $p = -0.35x + 239.25$
    (b) $p = -2.86x - 297$
    (c) $p = 1.6x + 16$
    (d) $p = 1.57x + 306.43$
    (e) $p = 0.625x - 10$

17. A company has bakeries in three towns: Fredericksburg, Johnson City, and Kerville. Each bakery produces kolaches, cakes, and cookies. The variables x, y, and z are the number of hours each bakery in Fredericksburg, Johnson City, and Kerville, respectively, will work so that together they can fill an order. The production capacities of the bakeries are:

	kolaches/hr	cakes/hr	cookies/hr
Fredericksburg	35	5	84
Johnson City	32	4	106
Kerrville	28	2	175

    The company receives an order for 53 cakes, 405 kolaches, and 2350 cookies. Which augmented matrix would be used to determine how many hours each bakery should work so that order will be filled?

    (a) $\left[\begin{array}{ccc|c} x & y & z & \\ 35 & 32 & 28 & 405 \\ 5 & 4 & 2 & 53 \\ 84 & 106 & 175 & 2350 \end{array}\right]$

    (b) $\left[\begin{array}{ccc|c} x & y & z & \\ 35 & 32 & 28 & 53 \\ 5 & 4 & 2 & 405 \\ 84 & 106 & 175 & 2350 \end{array}\right]$

    (c) $\left[\begin{array}{ccc|c} x & y & z & \\ 35 & 5 & 84 & 53 \\ 32 & 4 & 106 & 405 \\ 28 & 2 & 175 & 2350 \end{array}\right]$

    (d) $\left[\begin{array}{ccc|c} x & y & z & \\ 35 & 5 & 84 & 405 \\ 32 & 4 & 106 & 53 \\ 28 & 2 & 175 & 2350 \end{array}\right]$

    (e) None of these.

18. Give the solution to the system of equations represented by this augmented matrix. The variables are indicated in the first row.

$$\left[\begin{array}{ccc|c} x & y & z & \\ 1 & 0 & -2 & 5 \\ 0 & 1 & 1 & 3 \end{array}\right]$$

(a) $\begin{cases} x = 2z+5 \\ y = -z+3 \\ z = \text{any number} \end{cases}$

(b) $\begin{cases} x = 5 \\ y = 3 \\ z = \text{any number} \end{cases}$

(c) $\begin{cases} x = -2z+5 \\ y = -z+3 \\ z = \text{any number} \end{cases}$

(d) no solution

(e) none of the above

19. Compute.

$$3\begin{bmatrix} b+1 & 1 \\ 2 & 3 \end{bmatrix} - 2\begin{bmatrix} 1 & 2 \\ 3 & 1 \end{bmatrix}$$

(a) $\begin{bmatrix} 3b+1 & -1 \\ 0 & 7 \end{bmatrix}$

(b) $\begin{bmatrix} b-1 & -3 \\ -4 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 3b-1 & 1 \\ 2 & 3 \end{bmatrix}$

(d) $\begin{bmatrix} -6b+4 & -12b-11 \\ -66 & -30 \end{bmatrix}$

(e) $\begin{bmatrix} 3b+5 & 7 \\ 12 & 11 \end{bmatrix}$

20. Let J be a 2 x 3 matrix, let K be a 2 x 2 matrix, and let L be a 3 x 2 matrix. Which of the operations are **NOT** possible to compute with these matrices?

I) $3J + L^T$ II) JK III) LKJ

(a) only II
(b) only III
(c) only I
(d) only I and II
(e) only I and III

21. Which one of the following is a solution for X in the matrix equation below? Assume all matrices are square, all matrices are the same size, and all matrix algebra is defined.

$$C + DX = 3X + F$$

(a) $X = (D - 3I)^{-1}(F - C)$
(b) $X = (F - C)(D - 3I)^{-1}$
(c) $X = F - C(D - 3)^{-1}$
(d) $X = \dfrac{F - C}{D - 3I}$
(e) $X = (D - 3)^{-1}F - C$

22. Give the solution to the system of equations represented by this augmented matrix. The variables are indicated in the first row.

$$\left[\begin{array}{ccc|c} x & y & z & \\ 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 \end{array}\right]$$

(a) No solution
(b) $\begin{cases} x = 2 \\ y = 3 \\ z = \text{no solution} \end{cases}$
(c) $\begin{cases} x = 2 \\ y = 3 \\ z = \text{any number} \end{cases}$
(d) $\begin{cases} x = 2 \\ y = 3 \\ z = 1 \end{cases}$
(e) None of these.