

VERSION A

M.C.	
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TOTAL	

**MATH 141
EXAM 1
27 SEP 96**

**NAME
ROSTER #
SEAT #**

**PUT YOUR NAME AND VERSION LETTER (A) ON YOUR SCANT-
RON OR YOU WILL LOSE 10 POINTS!**

There are 18 multiple choice questions (5 points each) and 2 short answer problems.

You should have 3 sheets with writing on both sides of each page. You are responsible for checking that you have all the required problems listed above. Scratch paper must be turned in with your exam. It will be discarded before the exams are read, so keep that in mind while using it. There is more scratch paper if you need it. You may not use your own paper. Do not open the exam until told to do so.

1. Find the equation of the horizontal line that passes through the point $(-1,3)$.
- (A) $x = -1$ (B) $3y = -x$ (C) $y = x + 4$
 (D) $y = 3$ (E) none of the above
2. A company makes rakes. Each rake sells for \$26. The company has fixed costs of \$1000. The total cost to make 100 rakes is \$1600. What is the cost function?
 $C(x) =$
- (A) $26x + 1000$ (B) $16x + 1000$ (C) $6x + 1000$
 (D) $26x$ (E) none of the above
3. Find the break-even point for selling rakes.
- (A) $x = 1$ (B) $x = 50$ (C) $x = 100$
 (D) $x = 0$ (E) none of the above

temperature °F (x)	88.6	93.3	71.6	84.3	80.2
cricket chirps per minute (y)	80.0	79.2	64.0	72	68.4

4. Use the least-squares line to estimate the number of cricket chirps per minute when the temperature is 85° .
- (A) 72.0 (B) 73.8 (C) 85.0
 (D) 99.4 (E) none of the above
5. Which of the data points is furthest from the least squares line?
- (A) (88.6, 80.0) (B) (93.3, 79.2) (C) (71.6, 64.0)
 (D) (84.3, 72.0) (E) (80.2, 68.4)
6. For which k does the following system have infinite solutions?

$$3x + 2y = 1$$

$$6x + ky = 2$$

- (A) $k = 1$ (B) $k = 2$ (C) $k = 0$
 (D) $k = 4$ (E) none of the above

7. Which of the following matrices are in row-reduced form?

$$(I) \left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 3 \\ 0 & 1 & 1 & 0 & -1 \\ 0 & 0 & 0 & 1 & 2 \end{array} \right) \quad (II) \left(\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 3 \\ 0 & 1 & 1 & 0 & -1 \end{array} \right) \quad (III) \left(\begin{array}{ccc|c} 1 & 0 & 0 & 3 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 0 & 2 \end{array} \right)$$

- (A) I
(B) I and II
(C) II and III
(D) all are in RRF
(E) none are in RRF

8. Find the solution [in the form (x,y)] for the system

$$2x - 3y = 2$$

$$4x - 6y = 1$$

- (A) $(3/2y + 1, y)$
(B) $(3/2y + 1, 2/3(x - 1))$
(C) (0,0)
(D) no solution
(E) none of the above

9. Find the solution [in the form (x,y,z)] for the system

$$3x + y + 3z = -3$$

$$2x + y + 3z = 1$$

- (A) $(-4, 9 - 3z, 3 - y/3)$
(B) $(x, 9 - 3z, z)$
(C) $(-4, 9 - 3z, z)$
(D) no solution
(E) none of the above

10. What row operations must be performed to pivot on element a_{12} where

$$A = \left(\begin{array}{cc|c} 2 & 1 & -4 \\ 1 & -2 & 6 \end{array} \right)?$$

- (A) multiply row 2 by -2 and add to row 1
(B) multiply row 1 by 1/2 and then multiply row 1 by -1 and add to row 2
(C) multiply row 1 by 2 and add to row 2
(D) not possible to pivot on that element
(E) none of the above

11. What is the solution to the augmented matrix $A = \left(\begin{array}{ccc|c} 1 & 2 & -3 & 0 \\ 1 & 2 & -13 & 0 \\ 1 & 3 & 23 & 0 \end{array} \right)$

- (A) (0,0,0)
(B) (1,2,3)
(C) (x, y, z)
(D) no solution
(E) none of the above

12. Given $A = \begin{pmatrix} 1 & 2 & 3 \\ 6 & 0 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 2 \\ 0 & -1 \end{pmatrix}$, which of the following are not possible?
 (A) AB (B) $A^T B$ (C) B^{-1}
 (D) BA (E) none of the above

13. Solve the following for (x,y) : $\begin{pmatrix} x \\ 2 \end{pmatrix} + 3 \begin{pmatrix} -1 \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 11 \end{pmatrix}$
 (A) (1,9) (B) (3,3) (C) (1,3)
 (D) (3,9) (E) none of the above

14. Given the following information about corsages,

	<i>flowers</i>	<i>ribbon</i>	<i>dodads</i>
$A = \textit{regular}$	2	4	6
\textit{deluxe}	3	5	7

and flowers cost \$1 each, ribbon is \$.25 and dodads are \$.10, find a matrix B such that when it is multiplied by A will give the matrix C , the cost of each type of corsage.

- (A) $B = \begin{pmatrix} 1 & .25 & .10 \end{pmatrix}$, $C = AB$ (B) $B = \begin{pmatrix} 1 & .25 & .10 \end{pmatrix}$, $C = BA$
 (C) $B = \begin{pmatrix} 1 \\ .25 \\ .10 \end{pmatrix}$, $C = AB$ (D) $B = \begin{pmatrix} 1 \\ .25 \\ .10 \end{pmatrix}$, $C = BA$
 (E) none of the above
15. Given $A = \begin{pmatrix} 3 & a \\ 2 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} b & 1 \\ -1 & 4 \end{pmatrix}$, what is element a_{11} in the matrix AB ?
 (A) $3b - a$ (B) $3b - 2$ (C) $3b + a$
 (D) $3b$ (E) none of the above

16. Solve the system [answer in the form (x_1, x_2, x_3, x_4)]:

$$x_1 - 2x_2 + 3x_3 = -8$$

$$x_2 - x_3 + x_4 = 4$$

$$-2x_1 + 2x_2 - 2x_3 + 4x_4 = -12$$

$$2x_2 - 3x_3 + x_4 = 8$$

- (A) $(2, -22, 5, 10)$ (B) $(5, 14, 5, -5)$ (C) $(-52, 24, 80, 52)$
(D) $(0, 0, 0, 0)$ (E) none of the above
17. Rainbow Harbor Cruises charges \$8 per adult and \$4 per child for a round-trip ticket. On one weekend, 1000 people took the cruise on Saturday. The total receipts for Saturday were \$6400. Let x be how many adults and let y be how many children took the cruise on Saturday. Which matrix system corresponds to this problem?

- (A) $\begin{pmatrix} 1 & 8 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1000 \\ 6400 \end{pmatrix}$ (B) $\begin{pmatrix} 1 & 1 \\ 8 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1000 \\ 6400 \end{pmatrix}$
(C) $\begin{pmatrix} 1 & 1 \\ 8 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6400 \\ 1000 \end{pmatrix}$ (D) $\begin{pmatrix} 8 & 1 \\ 4 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6400 \\ 1000 \end{pmatrix}$
(E) none of the above

18. How many (adults, children) took the cruise on Saturday?

- (A) $(400, 600)$ (B) $(500, 500)$ (C) $(600, 400)$
(D) no solution (E) none of the above

19. Graph the following system and label the intersection point exactly:

$$x = 2$$

$$4x + 3y = 13$$

20. A dietician wishes to plan a meal around 3 foods. The percentage of the daily requirements of proteins, carbohydrates and iron contained in each ounce of the three foods is given in the following table. Set up (do not solve) the system of equations needed to determine how many ounces of each food is needed to exactly meet the daily requirements of protein, carbohydrates and iron (100 percent of each).

	% protein	% carbohydrate	% iron
food A	10	6	8
food B	10	12	6
food C	5	4	12