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Birzeit University
Mathematics Department
Math 135 - Second Exam
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Question 1. (45%).**Circle the most correct answer:**

1. The slope of the line passes through the two points $(2,-4)$ $(6,-1)$ is:
   (a) $\frac{-5}{4}$
   (b) $\frac{4}{-5}$
   (c) $\frac{4}{3}$
   (d) $\frac{3}{4}$

2. The determinant of the matrix $\begin{pmatrix} -1 & -4 \\ -2 & 3 \end{pmatrix}=$
   (a) 5.
   (b) -5.
   (c) -11.
   (d) None of the above.

3. The solution set of the equation $(x+2)^2+10=1$
   (a) No real solutions.
   (b) $\{5,-1\}$
   (c) $\{3,-3\}$
   (d) $\{-1,1\}$

4. If $A=\begin{pmatrix} 1 & 2 & 5 \\ 3 & 4 & 0 \\ 1 & 2 & 2 \end{pmatrix}$ then $2a_{11}-3a_{12}+\frac{1}{2}a_{23}=$
   (a) 4
   (b) -4
   (c) -7
   (d) -3

5. If $B = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$, then $4B^2 =$

(a) $\begin{pmatrix} 2 & 2 \\ 8 & 18 \end{pmatrix}$

(b) $\begin{pmatrix} 4 & 4 \\ 16 & 36 \end{pmatrix}$

(c) $\begin{pmatrix} -2 & -8 \\ 16 & 17 \end{pmatrix}$

(d) $\begin{pmatrix} -4 & -8 \\ 32 & 28 \end{pmatrix}$

6. which one of the following statements is ALWAYS true:

(a) (AB) equals (AB) for any two matrices.

(b) $(B - A)$ equals $(A - B)$ for any two matrices.

(c) $A(2CB)$ equals $2A(CB)$ for any matricesA, B, C.

(d) If (AB) equals the zero matrix, then either A or B equals the zero matrix.

7. The equation: $x^2 - 4x = 0$ has

(a) $x = 0, x = 2$ solutions.

(b) $x = 0, x = 4$ solutions.

(c) $x = 0, x = -4$ solutions.

(d) $x = 2, x = -2$ solutions.

8. The function $y = 4x - x^2$ has:

(a) Maximum at $x = 2$.

(b) Maximum at $x = \frac{1}{8}$.

(c) Minimum at $x = 2$.

(d) Minimum at $x = \frac{1}{8}$.

9. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}, B = \begin{pmatrix} -1 & 0 \\ 2 & -3 \end{pmatrix}$, then $A - B^T =$

(a) $\begin{pmatrix} 0 & -1 \\ 2 & 0 \end{pmatrix}$

(b) $\begin{pmatrix} 2 & -1 \\ 0 & 6 \end{pmatrix}$

(c) $\begin{pmatrix} 2 & 0 \\ -1 & 6 \end{pmatrix}$

(d) $\begin{pmatrix} 2 & -3 \\ 2 & 6 \end{pmatrix}$

10. The two lines $L_1 : 4x - 5y = 6$ and $L_2 : 8x - 10y = 12$ are

(a) Perpendicular.
(b) Parallel.
(c) Identical.
(d) Neither.

11. The solution set of the equation $(y+1)(y-3) = 5$

$y^2 - 3y + y - 3$
$y^2 - 2y - 3 = 0$
$-3 \quad +1$
$+3 \quad -1$

(a) $\{1, -3\}$
(b) $\{-1, 3\}$
(c) $\{4, -2\}$
(d) None of the above.

12. If $2\begin{pmatrix} x & 4 \\ 0 & -1 \end{pmatrix} - 3\begin{pmatrix} y & 1 \\ x-2 & -1 \end{pmatrix} = \begin{pmatrix} -1 & 5 \\ 3 & 1 \end{pmatrix}$, then:

$2x - 3y = -1$
$-3x + 6 = 3$
$-3x = -3$
$x = 1$
$2 - 3y = -1$
$-3y = -3$
$y = 1$

(a) $x = 1, \quad y = 1.$
(b) $x = -1, \quad y = 1.$
(c) $x = 1, \quad y = -1.$
(d) $x = -3, \quad y = \frac{-5}{3}.$

13. The line $\frac{x}{2} - y = 2$, has:

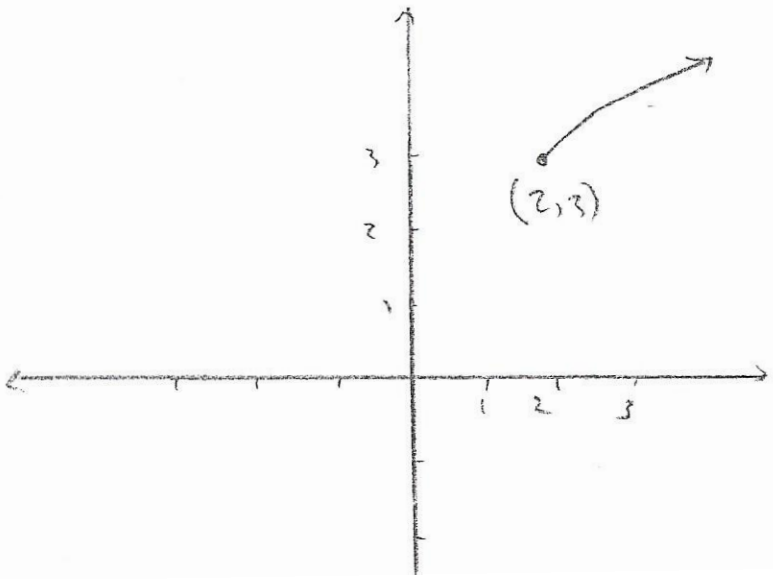
(a) $x - intercept = 1, \quad y - intercept = -1.$
(b) $x - intercept = 2, \quad y - intercept = -1.$
(c) $x - intercept = 2, \quad y - intercept = -2.$
(d) $x - intercept = 4, \quad y - intercept = -2.$

14. The following system $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 4 \\ 0 \\ 0 \end{pmatrix}$ has

(a) Infinitely many solutions.
(b) No solution.
(c) $x = 4, \quad y = 0, \quad z = 0.$

15. The following graph represents:

(a) $\sqrt{x-2} + 3$
(b) $\sqrt{x+2} - 3$
(c) $\sqrt{x+2} + 3$
(d) $\sqrt{x-2} - 3$



Question 2. (16%). Find the equation of the line in the following :

1. passes through the point $(-1, 2)$ and has slope$= -3$.

$(y - y_1) = m(x - x_1)$

$y - 2 = -3(x - -1)$

$y - 2 = -3x - 3$

$y = -3x - 1$

4

2. its $x - intercept = -4$, $y - intercept = -3$.

Slope $= 0$

$y = -3$

zero

3. passes through the point $(-1, 2)$ perpendicular to the line $3y - 2x = 4$

$y = \frac{2}{3}x + 4_3$ $\quad m = \frac{2}{3}$ $\quad m_2 = -\frac{3}{2}$

$y - y_1 = m(x - x_1)$

$(y - 2) = -\frac{3}{2}(x + 1)$

$y = -\frac{3}{2}x - \frac{3}{2} + 2$

4

1. Vertical line passes through the point $(-3, -5)$.

$x = -3$

4

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Question 3. (17%). *For the function $y = x^2 - 4x + 5$, determine the following:*

1. *Is the graph of the function opens upward or downward?*

open upward

2

2. *Find the vertex:*

$x = \frac{-b}{2a} = \frac{4}{2} = 2$

$y = (2)^2 - 4(2) + 5 = 4 - 8 + 5 = 1$

$(2, 1)$

4

3. *Find the axis of symmetry:*

$(2, 1)$ minimum

3

4. *Find the y-intercept:*

$y = 0^2 - 4(0) + 5$

$y = 5$

$(0, 5)$

2

5. *Find the x-intercept:*

$x^2 - 4x + 5 = 0$

$16 - 4 \times 5 \times 1$

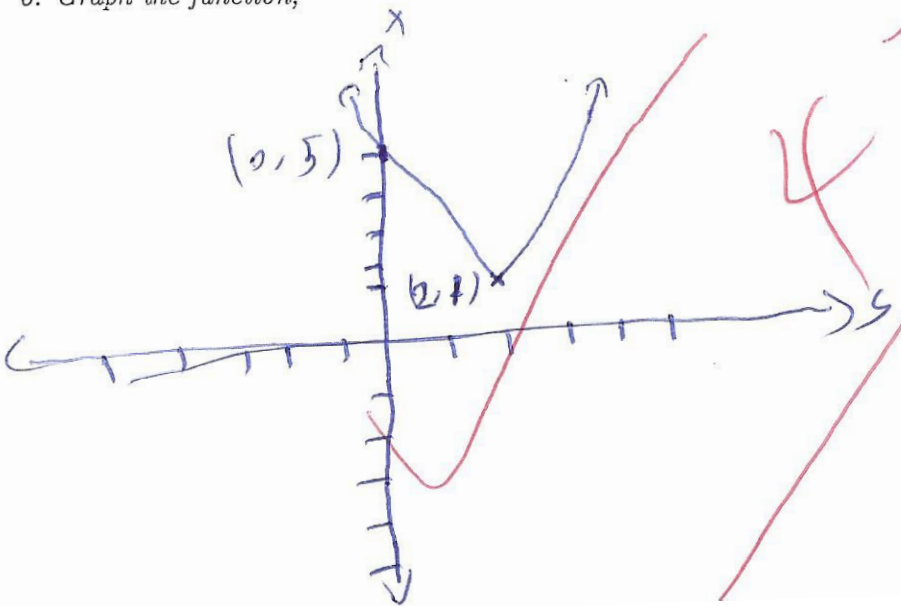
$= 16 - 20$

$= -4$

no real solution

2

6. *Graph the function;*



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Question 4. (10%). Use the **Gauss-Jordan elimination** to solve the following system:

$$\begin{pmatrix} 1 & 3 & 3 \\ 0 & 2 & 2 \\ 0 & -5 & -3 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix}=\begin{pmatrix} 9 \\ 2 \\ -7 \end{pmatrix}$$

$x+3y+3z=9$
$+6+0+3=9$

$$\left[\begin{array}{ccc|c} 1 & 3 & 3 & 9 \\ 0 & 2 & 2 & 2 \\ 0 & -5 & -3 & -7 \end{array}\right] \quad R_2/2 \to R_2$$

2

$$\left[\begin{array}{ccc|c} 1 & 3 & 3 & 9 \\ 0 & 1 & 1 & 1 \\ 0 & -5 & -3 & -7 \end{array}\right] \quad 5R_2 + R_3 \to R_3$$

$0\ 5\ 5\ 5$
$0\ -5\ -3\ -7$
$0\ 0\ +2\ -2$

2

$$\left[\begin{array}{ccc|c} 1 & 3 & 3 & 9 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 2 & -2 \end{array}\right] \quad -3R_2 + R_1 \to R_1$$

$0\ -3\ -3\ -3$
$0\ 3\ 3\ 9$
$0\ 0\ 0\ +6$

2

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 6 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 2 & -2 \end{array}\right] \quad \frac{R_3}{2} \to R_3$$

2

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 6 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & -1 \end{array}\right] \quad -R_3 + R_2 \to R_2$$

$0\ 0\ -1\ 1$
$0\ 1\ 1\ 1$
$0\ 1\ 0\ 2$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 6 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -1 \end{array}\right]$$

2

$x=6$
$y=2$
$z=-1$

2

12

Question 5. (6%). . solve the following system:

$$\begin{array}{r} 3 \\ -2 \end{array} \begin{array}{l} 2x + 3y = 2 \\ 3x + 2y = -2 \end{array}$$

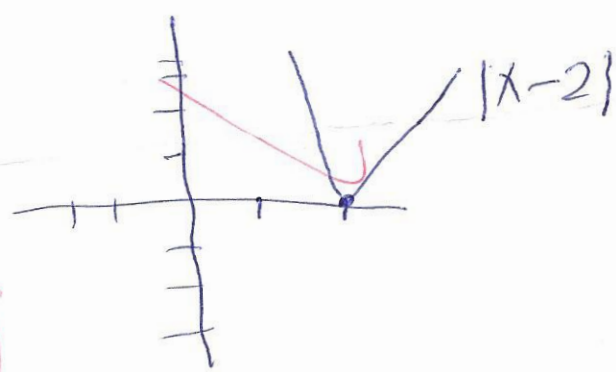
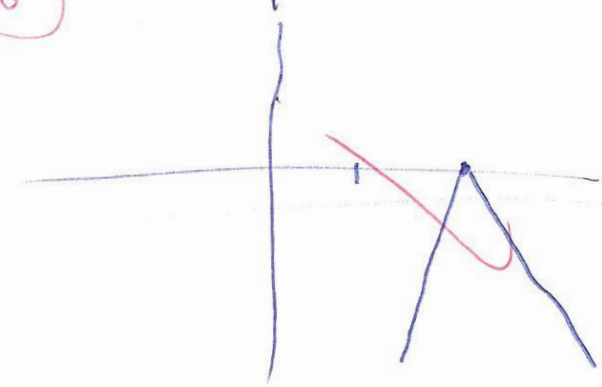
$6x + 9y = 6$
$-6x + -4y = 4$
$5y = 10$
$\boxed{y = 2}$

$2x + 3(2) = 2$
$2x + 6 = 2$
$2x = -4$
$\boxed{x = -2}$

+6

Question 6. (6%). *Sketch the graph of the following function:*

$$f(x) = -\,|\,x - 2\,|$$



+6