MAT 100: Exam 2 **Name:** _____
Fall – 2021
12/13/2021
85 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains 19 pages (including this cover page) and 18 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work.

Question	Points	Score
1	5	
2	10	
3	5	
4	5	
5	5	
6	5	
7	5	
8	5	
9	5	
10	5	
11	10	
12	5	
13	5	
14	5	
15	5	
16	5	
17	5	
18	5	
Total:	100	

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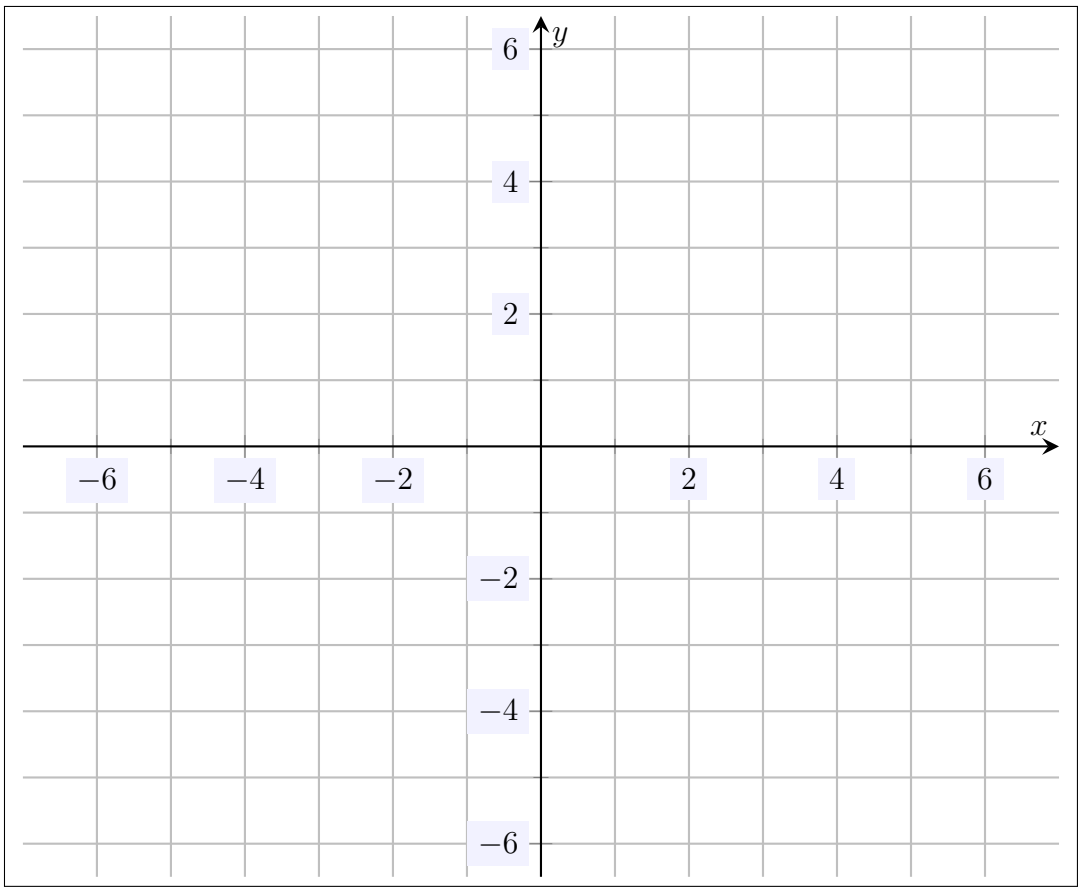
1. (5 points) Sketch the quadratic function $f(x) = 4 - (x+3)^2$ in the graph below. Your sketch should include the vertex and axis of symmetry for $f(x)$.



2. (10 points) Let $f(x)$ be the quadratic function $f(x) = 5x^2 + 10x - 7$.

   (a) Find the vertex and axis of symmetry for $f(x)$.

   (b) Does this parabola open upwards or downwards? Explain.

   (c) Is the function convex or concave?

   (d) Does the function have a maximum or minimum value? Explain.

   (e) Find the maximum or minimum value from (d).

3. (5 points) Find the vertex form of $y = x^2 - 8x + 21$.

4. (5 points) Factor the polynomial $x^2 - 16x + 55$.

5. (5 points) Factor the polynomial $x^2 - 2x - 48$.

6. (5 points) Factor the polynomial $2x^2 + 3x - 30$.

7. (5 points) Consider the function $f(x) = x^2 + 2x - 8$. Find the x and y intercepts for this function.

8. (5 points) Find the solutions to $6x - x^2 = 9$.

9. (5 points) Find the solutions to $x^2 = x + 20$.

10. (5 points) Using the quadratic equation, find the solutions to $x^2 - 2x - 7 = 0$.

11. (10 points) Consider the rational function $f(x) = \dfrac{x^2 - 9}{x^2 + 2x - 15}$.

    (a) Find the domain for $f(x)$.

    (b) Find the vertical asymptotes for $f(x)$.

    (c) Find the zeros for $f(x)$.

12. (5 points) Compute the following, being sure to simplify as much as possible:

$$\frac{3}{x^2-4} - \frac{x-1}{x^2-x-2}$$

13. (5 points) Compute the following, being sure to simplify as much as possible:

$$\frac{x^2 - 2x - 3}{x^2 + 6x - 7} \cdot \frac{x^2 + 9x + 14}{x^2 + 5x + 4}$$

14. (5 points) Compute the following, begin sure to simplify as much as possible:

$$\frac{\dfrac{x^2+5x}{x^2-1}}{\dfrac{x^2+3x-10}{x^2+8x-9}}$$

15. (5 points) Solve the following system of equations:

$$x + y = 4$$
$$x - y = 10$$

16. (5 points) Solve the following system of equations:

$$2x - 3y = 4$$
$$6x - 2y = 5$$

17. (5 points) Determine whether the point $(1, -5)$ is a solution to the following system of equations:

$$5x - y = 10$$
$$x + y = 0$$

18. (5 points) Explain why the following system of equations does not have a solution. Be sure to justify your answer.

$$-6x + y = 3$$
$$12x - 2y = -4$$