

**MAT 101: Exam 4**  
**Fall – 2022**  
**12/14/2022**  
**85 Minutes**

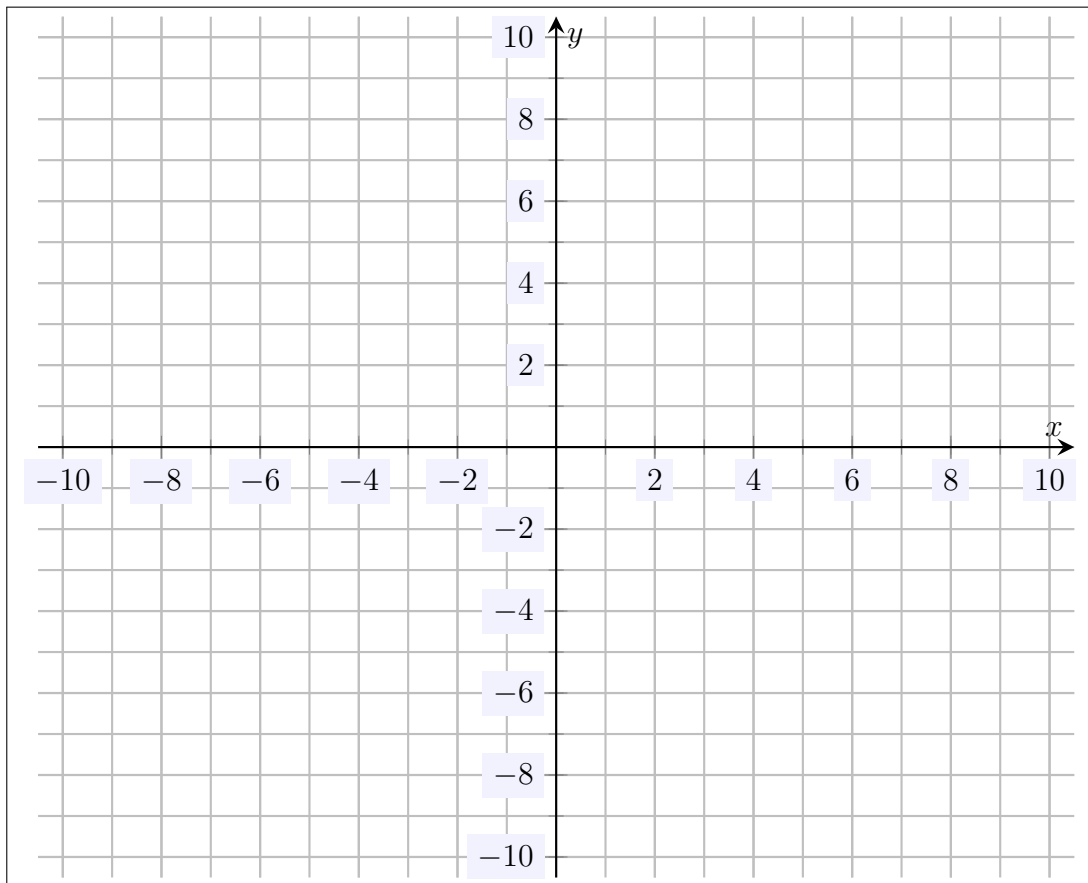
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**Name:** \_\_\_\_\_

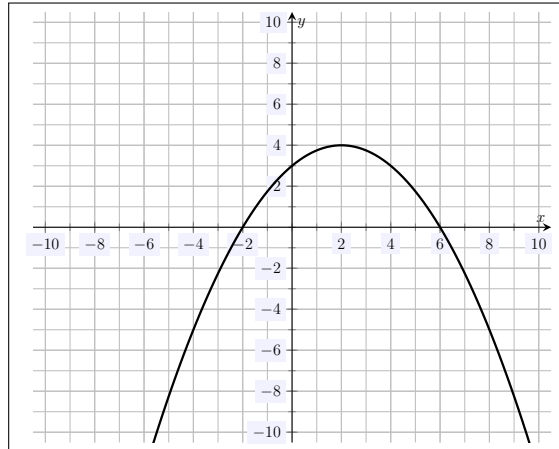
Write your name on the appropriate line on the exam cover sheet. This exam contains 15 pages (including this cover page) and 14 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work.

Question	Points	Score
1	10	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
9	10	
10	10	
11	10	
12	10	
13	10	
14	10	
Total:	140	

1. (10 points) Sketch the function  $y = (x + 6)^2 - 7$  as accurately as possible on the graph below. Your sketch should include the vertex and axis of symmetry.



2. (10 points) A quadratic function  $f(x) = ax^2 + bx + c$  is plotted below. Find  $a$ ,  $b$ , and  $c$  for this function.



3. (10 points) Consider the quadratic function  $f(x) = \frac{5}{3} - \left(x + \frac{3}{2}\right)^2$ .

- (a) Find the vertex and axis of symmetry for  $f(x)$ .
- (b) Does this parabola open upwards or downwards?
- (c) Is this parabola concave or convex?
- (d) Does this parabola have a maximum or minimum?
- (e) Find the maximum or minimum of  $f(x)$ , if it exists.

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4. (10 points) Showing all your work, find the vertex form of  $f(x) = 4x^2 + 4x - 6$ .

5. (10 points) Find the  $y$  and  $x$ -intercepts for the function  $f(x) = x^2 + 21x - 72$ .

6. (10 points) Use the discriminant of  $f(x) = x^2 - 3x - 108$  to show that  $f(x)$  has a 'nice' factorization and then find its factorization.

7. (10 points) Use the discriminant of some quadratic function to show that the equation given below does not have a 'nice' solution.

$$31 = x(14 - x)$$



8. (10 points) Showing all your work, factor the polynomial  $x^2 - 23x - 24$ . Verify that your factorization is correct.

9. (10 points) Showing all your work, factor the polynomial  $x^2 + 17x - 84$ .

10. (10 points) Showing all your work, factor the polynomial  $7x^2 + 18x - 9$ .

11. (10 points) Showing all your work, use the quadratic formula to factor the polynomial  $288x^2 - 1524x + 935$ .

12. (10 points) Showing all your work, solve the equation below then verify that your solution(s) are correct:

$$x^2 + 9 = 10x$$

13. (10 points) Showing all your work, solve the equation below:

$$6x^2 = 5 - 7x$$

14. (10 points) Showing all your work, solve the equation below:

$$-x^2 = 2(23 - 7x)$$