

Name: _____

CUNY ID#: _____

QUEENS COLLEGE DEPARTMENT OF MATHEMATICS

Math 115 Final Exam – Spring 2026

Time: 2 hours and 30 minutes

Directions: Answer all questions and show all your work in the space provided. For each question, write your final answer in the box provided. Solutions must be fully simplified and in algebraic form (no decimals). Calculators are **not** allowed on this exam. 100 points total.

1. Consider the points $A = (-5, 2)$ and $B = (-1, 5)$.
 - a. (2 points) Find the slope of the line that passes through points A and B .

- b. (2 points) Find the midpoint between points A and B .

- c. (4 points) Find an equation of a line passing through the point $(6, 2)$ that is perpendicular to the line through points A and B . Write your equation in slope-intercept form.

2. Consider the functions $f(x) = 3x^2 - 2x + 3$ and $g(x) = \frac{1}{2\sqrt{x-3}}$.
- a. (4 points) Evaluate and simplify $f(a - 2)$.

$$f(a - 2) =$$

- b. (3 points) Evaluate $g(21)$. Rationalize the denominator of the result and express any radicals in simplest form.

$$g(21) =$$

- c. (3 points) Find $2f(0) - g(7)$ and express in simplest form.

$$2f(0) - g(7) =$$

- d. (2 points) Write the domain of $g(x)$ in interval notation.

The domain of $g(x)$ is

3. (3 points each) Factor completely or write PRIME.

a. $8x^2 - 10x - 3$

b. $x^2 + 81$

c. $3x^3 - 48x$

4. (5 points each) Find all real solutions for each of the following equations.

a. $x^2 - 2x - 14 = -3$

$x =$

b. $\frac{3}{x+2} - 4 = \frac{6x}{x+2}$

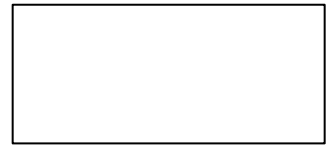
$x =$

c. $x - 2 = 3\sqrt{x+2}$

$x =$

5. (5 points each) Simplify the following expressions.

a. $\frac{(16x^2)^{-1/2}}{xy} \div \frac{y^2}{(64x^6)^{1/3}}$



b. $\frac{3x+1}{x^2-1} - \frac{1}{x+1}$



c. $\frac{1 - \frac{2}{x} - \frac{8}{x^2}}{\frac{16}{x^2} - 1}$

d. $(x - \sqrt{3})^2 + x(\sqrt{12} + x)$

6. (3 points) Rewrite $\sqrt{48x^5y^2}$ in simplified radical form.

7. Given the quadratic function $f(x) = -x^2 - 2x + 15$, find each of the following:

- a. (2 points) The zero(s) of the function.

- b. (3 points) The coordinates of the vertex. State whether the vertex is a minimum or a maximum point.

- c. (2 points) An equation of the axis of symmetry.

- d. (4 points) The domain and range of the function (expressed in interval notation).

The domain is

The range is

8. (4 points) Use long division to find $(3x^3 - 16x^2 - 72) \div (x - 6)$.

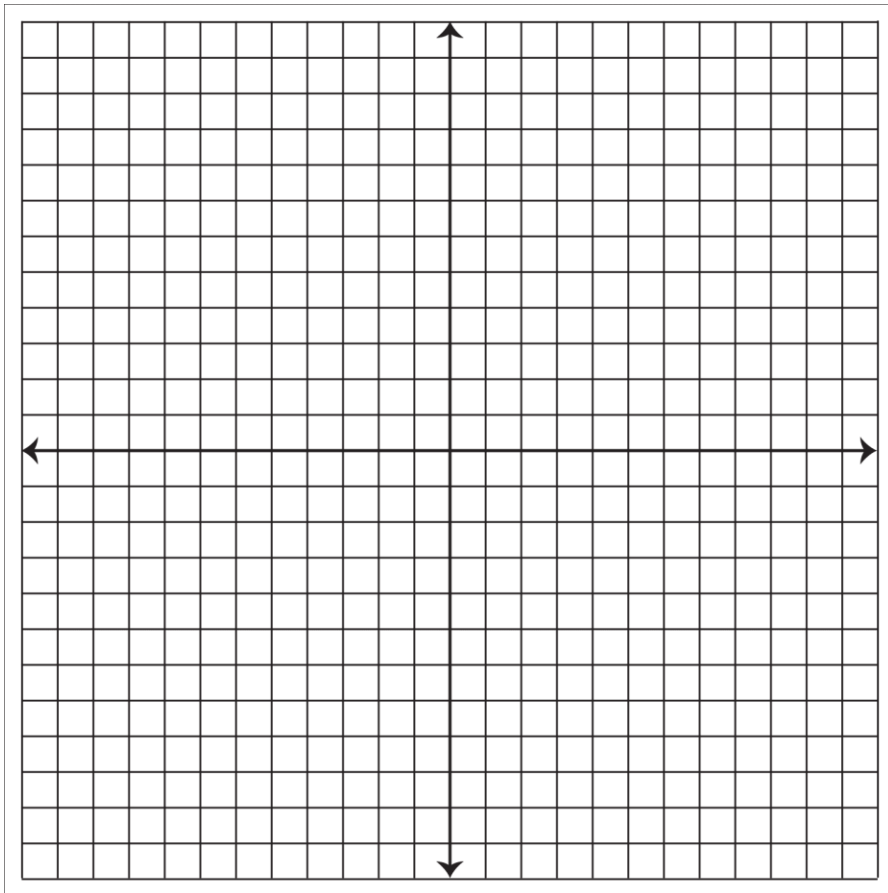
The quotient is

The remainder is

9. You have final exams coming up, so you stay up all night studying with friends at Rosenthal Library. In the morning, you go to a nearby bodega and buy coffee and sandwiches for your group. The price of coffee is \$3, and the price of a sandwich is \$7. You spend \$56 total to buy 12 items.
- a. (2 points) Let c be the number of coffees purchased and s be the number of sandwiches purchased. Write a system of two linear equations that relate c and s .
- b. (4 points) Use algebra to solve the system of linear equations and determine how many of each item was purchased.

10. (6 points each) Sketch the graphs of the following equations. Label the coordinates of at least two points on each graph. Give the domain and range of each graph, expressed in interval notation.

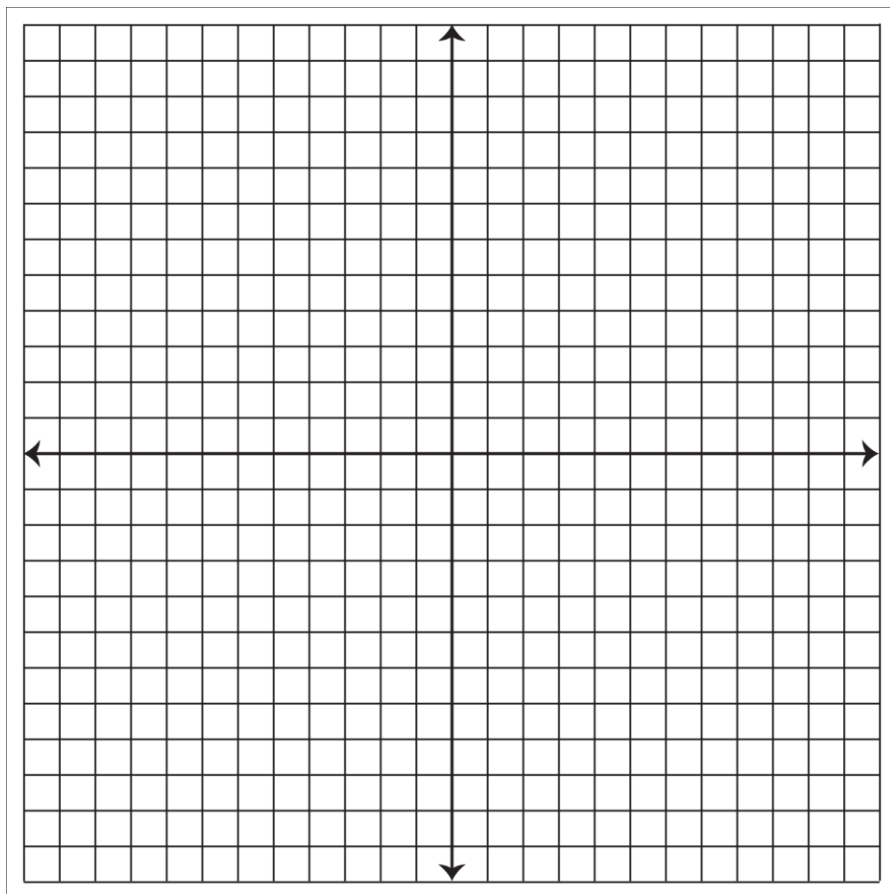
a. $3x - 4y = 12$



The domain is

The range is

b. $(x - 4)^2 + y^2 = 9$



The domain is

The range is

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