

Final Examination

$2\frac{1}{2}$ Hours

MATH 115 COLLEGE ALGEBRA FOR PRECALCULUS

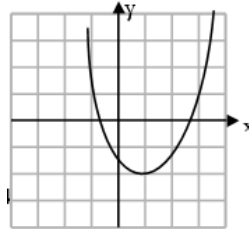
SPRING 2025

Directions: Answer all questions and show all work in the provided blue book. Use algebraic methods for all solutions, and express final answers in simplest form.

1. Determine whether each of the following relations is a function. Briefly justify your answer.

a) $\{(3, -2), (2, -1), (1, 0), (2, 1), (3, 2)\}$

b)



2. Consider two points, $A = (4, -2)$ and $B = (0, 4)$.

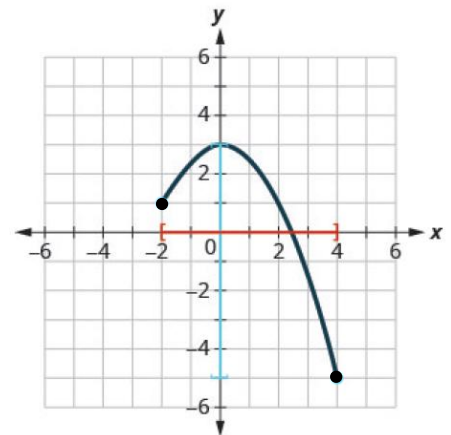
- Find an equation of the line that passes through points A and B .
- Find an equation of the horizontal line that passes through point A .
- Find the length of the line segment $\overline{AB}$.
- Find an equation of the circle centered at point A with the radius length of 3.

3. A line L has an equation $2x + 3y = 6$.

- Find the coordinates of the x -intercept and y -intercept.
- Graph the line L using either the x - and y -intercepts or the slope and y -intercept.
- Find an equation of the line perpendicular to line L that passes through $(0, -1)$.

4. Use the graph of $f(x)$ on the right to answer the following questions.

- Determine $f(2)$.
- Find the value(s) of x for which $f(x) = 1$.
- Express the domain of $f(x)$ in interval notation.
- Express the range of $f(x)$ in interval notation.



5. Given that $f(x) = x^2 - x + 3$, $g(x) = \frac{1}{\sqrt{x}-1}$, and $h(x) = \frac{1}{x+2}$

- Evaluate and simplify $f(a + 2)$.
- Rationalize the denominator of $g(x)$ and simplify.
- Express the domain of $h(x)$ in interval notation.

6. Factor completely or state if it is prime.

- $ax - bx - 3ay + 3by$
- $3x^2 - 5x - 2$
- $x^2 + 9$
- $2a^4b - 16ab^4$

7. Find all real solutions for each of the following equations.

- $x^2 - 6x + 4 = 0$
- $(x + 2)(x - 2) = 5$
- $\sqrt{x + 5} - \sqrt{x - 3} = 2$
- $\frac{16}{x^2 - 16} - \frac{3}{x + 4} = \frac{2}{x - 4}$

(continued on the back)

8. Simplify the following expressions.

a) $\frac{3x + 9}{x^2 + 7x + 10} - \frac{2}{x + 5}$

b) $\frac{x^2 - x - 6}{2x^3 - 6x^2} \div \frac{x^2 - 4}{x^3 - 2x^2}$

c) $2x^{1/3}(3x^{2/3} + x^{-1/3})$

d) $3y\sqrt{2x^3} + 5xy\sqrt{2x} + \sqrt{8x^3y^2}$

9. Simplify and write your answer using only positive exponents.

$$\left(\frac{(2x^3)^{-2}(x^8y^2)^{1/2}}{(8x^{-12}y^9)^{1/3}} \right)^{-2}$$

10. Simplify:

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

11. Use long division to divide:

$$\frac{x^4 - 4x^2 + 5x + 8}{x + 2}$$

12. Given $f(x) = x^2 + 2x - 8$, determine the following.

- a) The zeros of f .
- b) The coordinates of its y -intercept.
- c) The coordinates of its vertex.
- d) An equation of the axis of symmetry.

13. A train ticket costs \$10 for an adult and \$5 for a child. A group of 20 people paid a total of \$200 for their tickets. How many adults and how many children are in the group? You may use either the substitution method or the addition method to solve.

Suggested Point Values (out of 123 points):

- Question 1: 2 points each part
- Questions 2, 3, 4, 5, 12: 3 points each part
- Questions 6, 7, 8: 4 points each part
- Questions 9, 10, 11, 13: 5 points