

Math 1111 Final Exam Fall 2003

1. Simplify

$$\frac{(6x^3y^2)^2}{2x^4y^0}$$

2. Perform the indicated operation and simplify.

$$5(x^2 - 2x + 1) - 3(x^2 + x - 1)$$

3. Reduce the rational expression to lowest terms.

$$\frac{x^3 + 1}{x^2 + 2x + 1}$$

4. Perform the indicated operation and simplify. Leave your answer in factored form.

$$\frac{5x}{x^2 - 9} - \frac{2}{x + 3}$$

5. Simplify. Assume that the variables are positive.

$$(x^6y^9)^{\frac{2}{3}}$$

6. Rationalize the denominator.

$$\frac{3}{\sqrt{7} + 2}$$

7. Solve the equation.

$$\frac{2x + 1}{3} + 23 = 3x$$

8. It takes Harry 6 hours to paint his kitchen. If Tracy helps him, they can paint the kitchen in 4 hours working together. How long would it take Tracy to paint the kitchen if he works alone?

9. Find all the real number solutions.

$$|2x + 3| = 5$$

10. Solve the equation in the complex number system.

$$2x^2 - x + 3 = 0$$

11. Solve the equation in the complex number system.

$$x^4 - 3x^2 - 4 = 0$$

12. Solve the equation.

$$\sqrt{x + 4} - x = 2$$

13. Solve the inequality.

$$3(2x + 1) < 7 + 5x$$

14. Solve the inequality.

$$\frac{x - 5}{x + 2} \geq 0$$

15. Find the length of the line segment having the endpoints
- $(3, 1)$
- and
- $(5, -3)$
- .

16. Find the slope of the line passing through the points
- $(-4, 5)$
- and
- $(0, 2)$
- .

17. Find an equation of the line parallel to
- $y = 3x + 5$
- and passing through the point
- $(4, -1)$
- . Express your answer in general form or slope-intercept form.

18. Find the center and radius of the circle described by the equation:

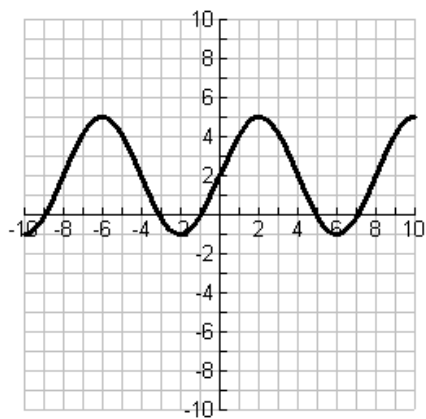
$$x^2 + y^2 + 6x - 2y - 15 = 0$$

19. Write a general formula to describe the variation. Include the value of the constant of proportionality. z varies directly as x and inversely as the square root of y ; $z = 4$ when $x = 3$ and $y = 4$.

20. Find the domain of the function f .

$$f(x) = \frac{x}{x + 15}$$

21. Consider the graph of f . Find $f(2)$.



22. Let $f(x) = x^3 + 5$ and $g(x) = \sqrt[3]{x - 5}$. Find $(f \circ g)(x)$.

23. Let $f(x) = \frac{5}{2x + 3}$. Find f^{-1} , the inverse function of f .

24. Sketch the graph of $y = 2x^2 - 4x + 3$. Label the vertex.

25. Find the remainder if $f(x) = x^3 - 2x^2 + 3x - 5$ is divided by $g(x) = x - 2$.

26. Find the amount that results from investing \$6,000 at 8% compounded quarterly after a period of 20 years. Use the correct formula.

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

or $A = Pe^{rt}$

27. Solve for x .

$$\log_3(x + 7) - \log_3(x - 1) = 2$$

28. Solve for x . Express your answer using the exact value, or a three decimal place approximation.

$$3^{2x+1} = 15$$

29. Solve the system of equations.

$$\begin{cases} x - y + 3z = 1 \\ 2x + 2y + z = -3 \\ 4x + 3y + z = -7 \end{cases}$$

30. Maximize the function $z = 3x - y$ subject to the following constraints:

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x \leq 3 \\ y \leq 4 \\ x + y \geq 3 \end{cases}$$