

**MATH 1111 FINAL EXAM
FALL 2001**

Instructions: Simplify all answers, leave no negative exponents, and reduce all fractions.

1. Simplify:

$$\frac{(4x^{-4}y^6)^{\frac{1}{2}}}{xy^{-1}}, x > 0, y > 0$$

2. Perform the indicated operation.

$$(x - 2)(x^2 + 2x + 4)$$

3. Perform the indicated operations and simplify. Leave your answer in factored form.

$$\frac{2x}{x^2 - 9} + \frac{x}{x + 3} - \frac{4}{x - 3}$$

4. Simplify the expression:

$$\sqrt{2x^5y} \cdot \sqrt{\frac{8y}{x}}, x > 0, y > 0$$

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

$$\frac{x^2 - 4x + 4}{4x^2 - 4x} \div \frac{x^2 - x - 2}{2x^3 - 2x^2}$$

6. Completely factor the expression:

$$2x^3 - 4x^2 - 3x + 6$$

7. Tevin has two solutions available in the laboratory, one with 5% alcohol, and the other with 10% alcohol. How much of each should he mix together to obtain 5 gallons of an 8% solution?

8. Solve the equation:

$$x^2 - 2x - 6 = 0$$

9. Solve the equation:

$$\sqrt{x - 5} - 3 = 0$$

10. Solve the equation:

$$|2x - 3| = 5$$

11. Solve the inequality:

$$7 - 10x > -13$$

12. Solve the inequality:

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

13. Find the midpoint of the segment joining the points (4, 1) and (0, 5).

14. Graph the line that has a y-intercept at 1 and slope = -2.

15. Find an equation of the line containing the points (-3, 2) and (-1, 6). Express your answer in either the general or slope-intercept form.

16. Find an equation of the line containing the point $(-3, 2)$ and perpendicular to the line $y = 3x + 10$. Express your answer in either the general or slope-intercept form.

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

$$x^2 + y^2 + 2x - 6y + 1 = 0$$

18. Write a formula to describe the variation: z varies directly as the cube root of x and inversely as the square y ; $z = 1$ when $x = 8$ and $y = 4$.

19. Find the domain of the function f :

$$f(x) = \frac{2x+1}{x+4}$$

20. Let $f(x) = x^2 - 2x$ and $g(x) = x + 2$. Find $(f \circ g)(x)$.

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

22. Let $f(x) = 2x^2 + 4x + 1$. Find the vertex of the parabola represented by the equation: $y = f(x)$

23. Find the quotient when $4x^3 - 5x^2 - 8x + 5$ is divided by $x + 1$.

24. Multiply and write the expression in the standard form $a + bi$.

$$(1 + i)(2 - i)$$

25. Find the amount that results from investing \$2,000 at 8% compounded quarterly after a period of 10 years. $(A = P(1 + \frac{r}{n})^{nt})$

26. Solve for x :

$$\log_2(3x + 5) = 3$$

27. Express $3 \log(x) + \log(y) - 2 \log(z)$ as a single logarithm.

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

$$3^{x+1} = 7$$

29. Solve the system of equations:

$$\begin{cases} 3x - 2y = -5 \\ 5x + 3y = 17 \end{cases}$$

30. Minimize the function $z = 2x + 3y$ subject to the following:

$$\begin{cases} x \geq 0 \\ y \geq 0 \\ x \geq 1 \\ y \geq 2 \\ x + y \leq 4 \end{cases}$$