

# Math 1111 Final Exam Fall 2000

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

1. Simplify:  $\frac{(ab^2)^3}{ab^{-1}}$

2. Perform the indicated operations:

$$(2x^3 + 4x^2 - x + 1) - 3(x^2 - 2x + 5)$$

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

$$\frac{3}{(x+1)(x-3)} - \frac{2}{x+1}$$

4. Rationalize the denominator:  $\frac{3}{\sqrt{5}-1}$

5. Simplify the expression. Assume that the variable is positive.

$$(-8a^6)^{1/3}$$

6. Factor the expression:  $x^3 + 64$

7. Tony has \$4.00 to spend on candy. He wants licorice, which costs \$1.50 per pound, and jawbreakers, which cost \$2.50 per pound. If Tony buys 1.5 pounds of licorice, how many pounds of jawbreakers can he buy? Assume there is no sales tax.

8. Find all complex solutions:  $3x^2 + x = -1$

9. Solve for  $x$ :  $\sqrt{10-3x} + 2 = x$

10. Solve the equation:  $|4x + 3| = 2$

11. Solve the inequality:  $5 - 3x \leq 8$

12. Solve the inequality:  $\frac{x+1}{x-3} \geq 0$

13. Find the length of the line segment joining the points  $(-1, 4)$  and  $(2, 3)$ .

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

15. Find the slope of the line  $2x - y + 6 = 0$ .

16. Write the equation of the line which has slope equal to 3 and passes through the point  $(6, -4)$ . Express your answer in slope-intercept form or general form.

17. Find the radius of the circle described by the equation

$$x^2 + y^2 - 8x + 2y + 1 = 0$$

18. The number of people in a swimming pool varies directly with the temperature. If there are 20 people in the pool when it is  $80^\circ$  outside, how many people will be in the pool when it is  $100^\circ$ ?

19. Find the domain of the function  $f(x) = \frac{x}{x+9}$ .

20. Let  $f(x) = x^2 - x + 1$  and  $g(x) = x + 1$ . Find  $(f \circ g)(x)$ .

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

22. Determine whether the quadratic function  $f(x) = 5x^2 - 200x + 150$  has a maximum or minimum value and find that value.

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

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

$$(2 + i)(3 - 2i)$$

25. If Christi invests \$1500 at 8% compounded continuously, what will her investment be worth after 4 years? ( $A = Pe^{rt}$ )

26. Change the logarithmic expression  $\log_n 6 = 2$  to an equivalent exponential expression.

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

28. Solve for  $x$ :  $2^x = 5$

29. Solve the system of equations:

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

30. Minimize the function  $z = 5x + 3y$  subject to the following:

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