

MATH 0200: PREPARATION FOR SCIENTIFIC CALCULUS

Review Midterm Exam 1

1. Explain why each of the following statements is false.

(a) The graph of $g(x) = f(x + 2) + 2$ can be obtained from the graph of f by shifting it 2 units up and 2 units to the right.

(b) The polynomial $p(x) = x^3 - x^2 - 10x - 8$ has zeros at -1 and 3 .

2. Compute $f^{-1}(y)$ for the function $f(x) = \frac{2x + 1}{3x - 4}$.

3. Compute the compositions $f \circ g$ and $g \circ f$ for the functions $f(x) = \sqrt{x}$, $g(x) = \frac{x + 1}{x + 2}$. Find $(f \circ g)(2)$.

4. List all vertical and horizontal asymptotes for the rational function

$$f(x) = \frac{9x + 5}{x^2 - x - 6}.$$

5. Find the equation of the circle centered at $(5, 1)$ and containing the point $(-2, 3)$.

6. Find the equation of the line containing the point $(-4, -5)$ and parallel to the line through the points $(7, 1)$ and $(5, 6)$.

7. Let $f(x) = 4 + 5\log_3(7x + 2)$.

(a) Find the domain of f .

(b) Compute $f^{-1}(y)$.

8. Given that $\log_2 x = 7$ and $\log_2 y = 3$, evaluate the expression

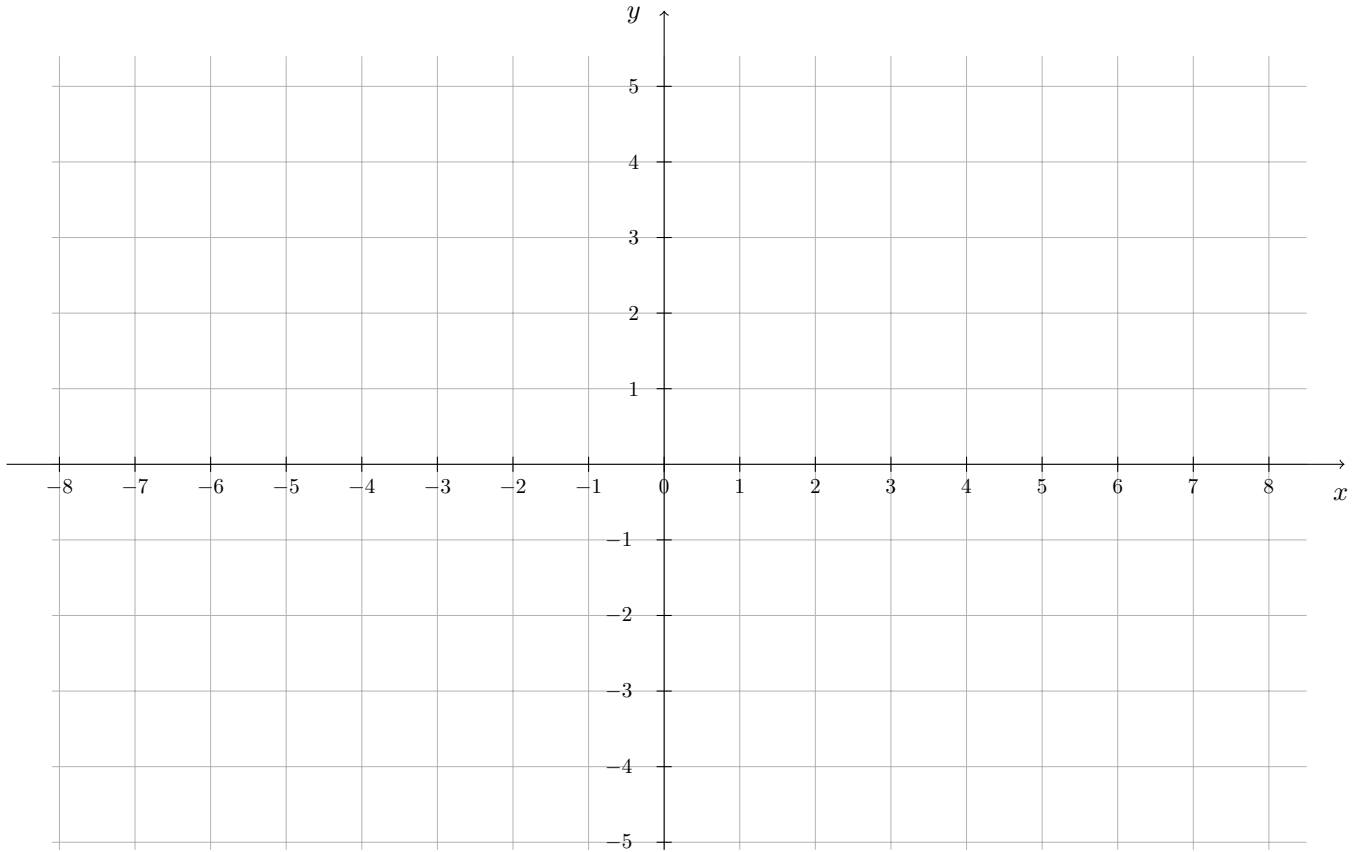
$$\log_2 \left(\frac{x^2 y^3}{4} \right).$$

9. Find all solutions to the equation

$$\log_2(x + 5) - \log_2(x - 1) = 2.$$

10. Plot the following items on the same coordinate plane below:

- (a) The circle $x^2 + y^2 = 16$.
- (b) The points $(2, 2)$ and $(-2, 2)$.
- (c) The parabola $y = \frac{1}{2}x^2 - 3$ with domain $[-4, 4]$.



11. Suppose a bank wants to advertise that \$1000 deposited in its savings account will grow to \$1050 in one year. This bank compounds interest daily (365 times per year). What minimal annual interest rate must the bank pay?