MATH 105

Test 1

October 4, 2006

Name:

- No books or calculators are allowed.

- Please show all your work.

- Please simplify your answers.

- Each problem is worth 5 points.

1. Simplify: $\left(\dfrac{2xy^3}{x^4y^{-1}}\right)^2$
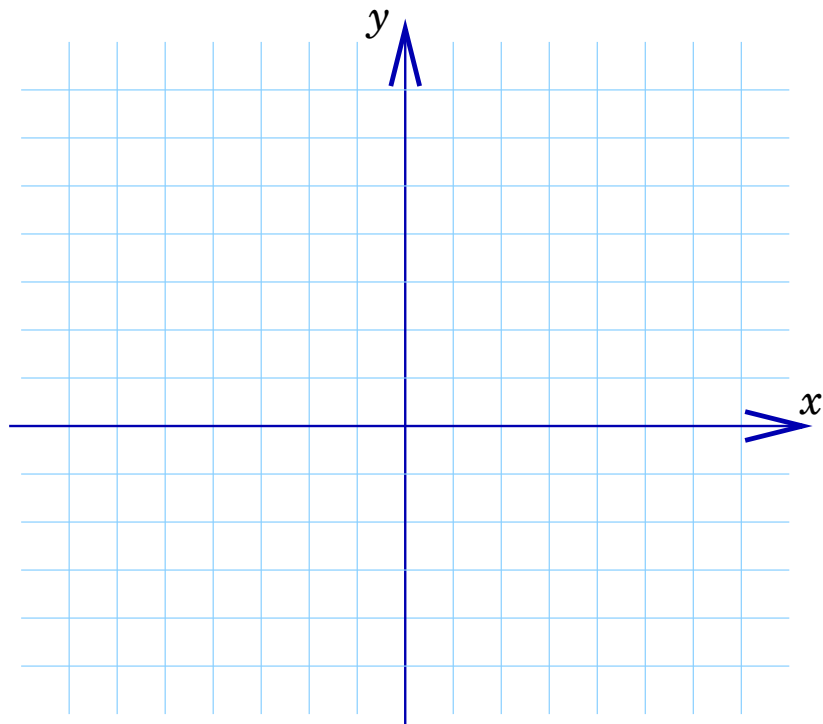
2. Simplify: $\dfrac{x}{x-2} - \dfrac{x^2}{x^2-4}$

3. Simplify: $(1+2i)(3-4i) + (5+6i)$
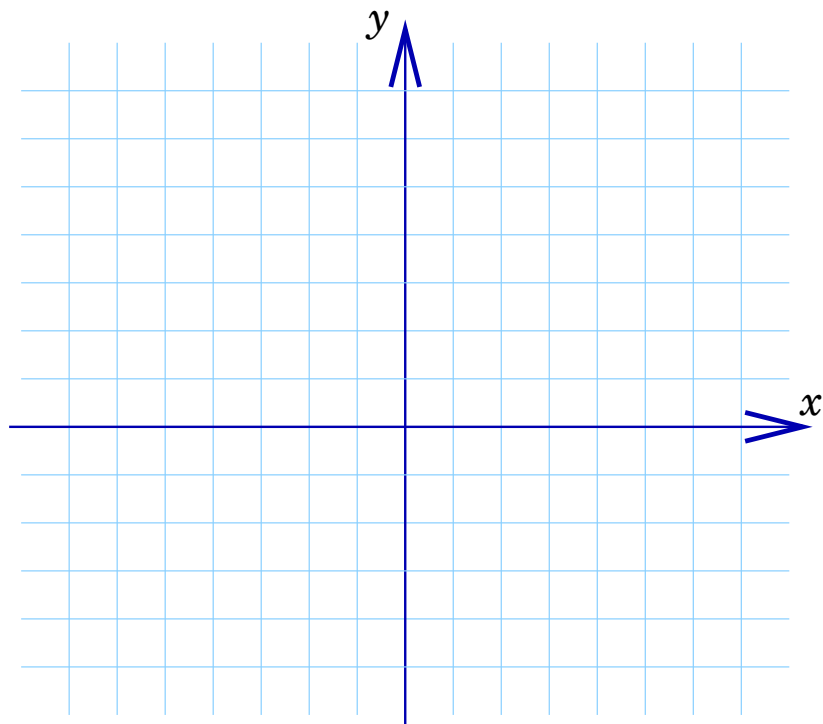
4. Simplify: $\log_2 \dfrac{1}{16} - \log_4 2$

5. Solve the equation (that is, find all real and complex roots): $x^3 - 5x^2 + 12x - 8 = 0$.
   (Hint: note that $x = 1$ is a root.)
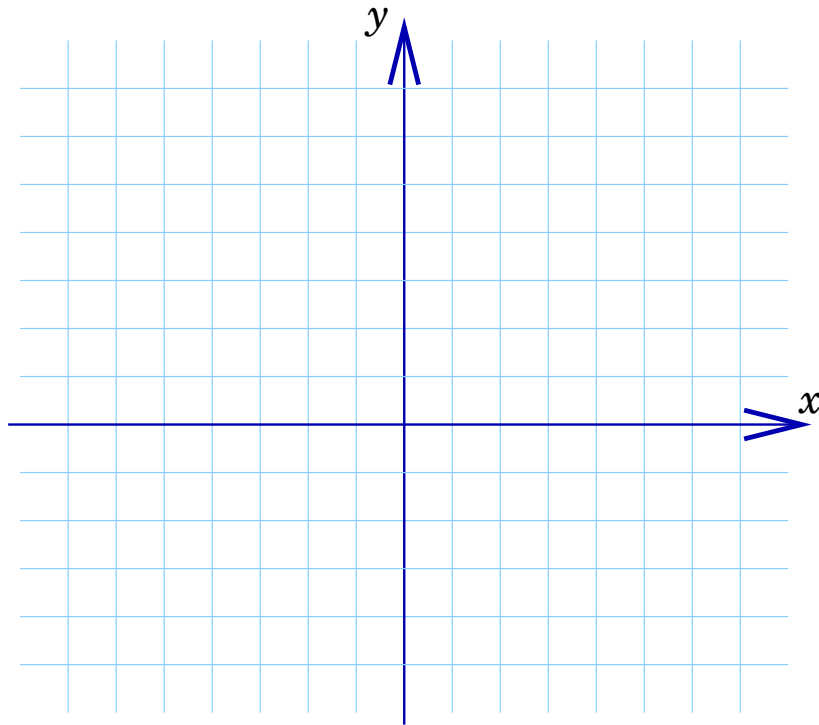
6. Solve the inequality: $x^3(x - 3) \leq 0$.
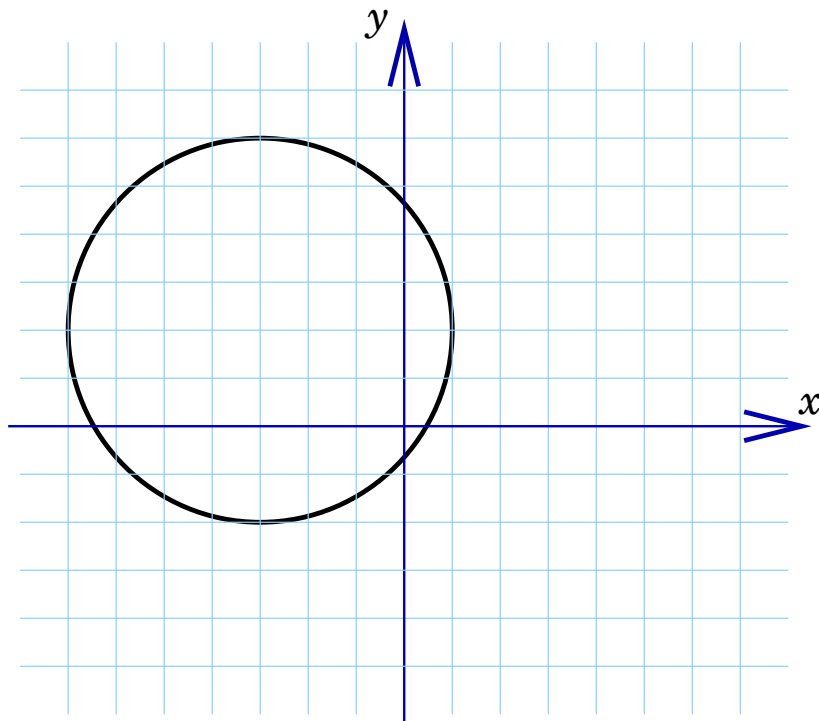
7. Sketch the graph of $f(x) = -2x + 1$.

8. Sketch the graph of $g(x) = \dfrac{1}{2}x^2 - 1$.

9. Sketch the graph of $h(x) = \dfrac{2x}{x-1}$.

10. Find an equation of the circle shown below.

11. **(For extra credit)** Find a quadratic polynomial $f(x) = ax^2 + bx + c$ such that $x = 0$ is a root of $f(x)$, $f(1) = 5$, and $f(2) = 9$.