

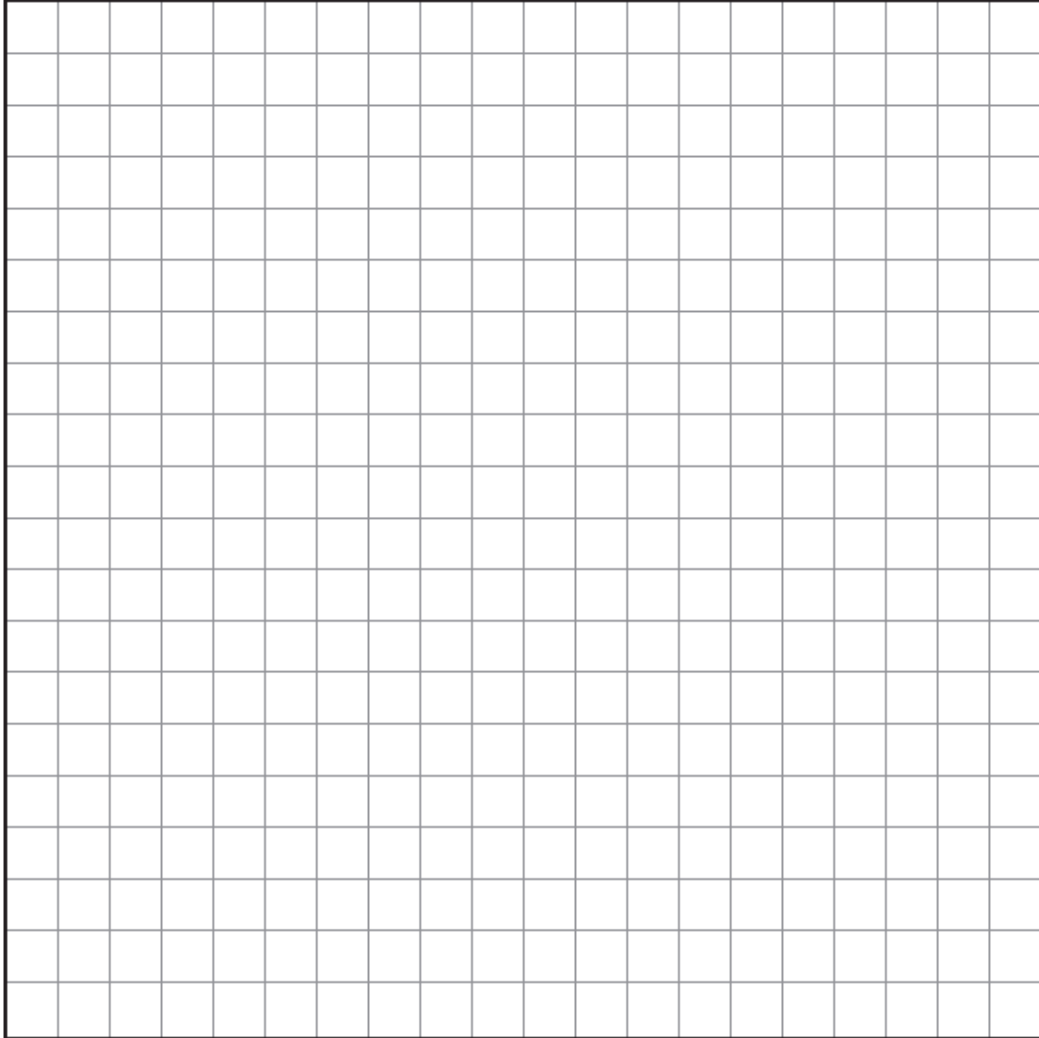
Name: \_\_\_\_\_

**MS5 Exam 4 Review Sheet**

**Exam 4 will be on Wednesday, December 13, 2006.** The exam will focus on the following topics: parabolas, circles, ellipses, and hyperbolas; composition of functions; inverse variation (including its graph, the equilateral hyperbola); finding inverse functions algebraically and graphically (by reflecting in the line  $y = x$ ); solving application problems involving quadratic functions, both graphically and algebraically. Though the emphasis will be on these topics, you are still expected to know all of the concepts and skills taught since the beginning of the semester. Graphing calculators are *required* on this exam, but the following are not permitted: TI-89, TI-92, or any calculator with symbolic manipulation abilities.

- The graph of the equation  $y = (x + 2)^2$  is
  - a straight line
  - a circle
  - an ellipse
  - a parabola
- If the graphs of  $x^2 + y^2 = 16$  and  $y = -3$  were drawn on the same set of axes, the total number of points common to the graphs would be:
  - 1
  - 2
  - 3
  - 4
- Given the equation  $0 = ax^2 + bx + c$ , in which  $a$ ,  $b$ , and  $c$  are integers. If the discriminant of this equation is equal to 8, then the roots of the equation must be
  - real
  - positive
  - equal
  - rational
- The equation whose graph is an ellipse is
  - $4x^2 + 9y = 18$
  - $3x^2 = 7 + 5y^2$
  - $3x^2 = 7 - 5y^2$
  - $4x + 9y = 36$
- If  $f(x) = x^3 - 2x^2$ , then  $f(i)$  is equivalent to
  - $-2 + i$
  - $-2 - i$
  - $2 + i$
  - $2 - i$
- If  $r$  varies inversely as  $s$ , then their
  - difference is constant
  - sum is constant
  - quotient is constant
  - product is constant
- If  $g(x) = \frac{1}{x-2}$ , where  $x \neq 2$ , what is  $g^{-1}\left(\frac{1}{2}\right)$ ?
- Write an equation for the axis of symmetry of the graph of  $y = 3x^2 - 12x + 5$ .
- Write the equation of an ellipse with center  $(-4, 2)$  and that is tangent to both the  $x$ -axis and the  $y$ -axis.
- Write the equation of a hyperbola centered at the origin with  $y$ -intercepts of 4 and  $-4$ .
- When the graphs of the equations  $xy = -16$  and  $y = -x$  are drawn on the same set of axes, what is the total number of common points?
- If  $f(x) = \frac{3}{x^2 - 1}$  and  $g(x) = \frac{1}{x + 1}$ , then find each of the following in simplest form.
  - $(f \circ g)(x)$
  - $(g \circ f)(x)$
  - $(g \circ g)(x)$

13. The height of a projectile is modeled by the equation  $y = -2x^2 + 38x + 10$ , where  $x$  is time, in seconds, and  $y$  is height, in feet. Graph the equation on the accompanying grid. Use your graph to determine the interval of time, to the *nearest tenth of a second*, during which the projectile is *at least* 125 feet above the ground.



14. A model rocket is launched from ground level. At  $t$  seconds after it is launched, it is  $h$  meters above the ground, where  $h(t) = -4.9t^2 + 68.6t$ . What is the maximum height, to the *nearest meter*, attained by the model rocket? After how many seconds does the model rocket hit the ground? [*Only an algebraic solution will be accepted.*]
15. The price per person to rent a limousine for a prom varies inversely as the number of passengers. If five people rent the limousine, the cost is \$70 each. How many people are renting the limousine when the cost *per couple* is \$87.50?
16. Solve and check:  $2\sqrt{2x+3} + x = 1$
17. State the domain of  $g(x) = \frac{2x}{\sqrt{3x^2 + x - 2}}$
18. Find the inverse of  $f(x)$  algebraically if  $f(x) = 4x^2 + 1$ . Is the inverse a function? Explain.