

## TAKE HOME EXAM I

MAT 122 · FALL 2008

You must show all work to get full credit.

**Problem 1.** If  $x > 1$  and  $\frac{\sqrt{x}}{x^3} = x^m$  what is the value of  $m$ ?

**Problem 2.** The line  $l$  contains the points  $(0, 0)$  and  $(1, 2)$ . If line  $m$  contains the point  $(0, 0)$  and is perpendicular to  $l$ , what is an equation of  $m$ ?

**Problem 3.** The projected sales volume of a video game cartridge is given by the function

$$s(p) = \frac{3000}{2p + a}$$

where  $s$  is the number of cartridges sold, in thousands;  $p$  is the price per cartridge, in dollars; and  $a$  is a constant. If according to the projections, 100,000 cartridges are sold at \$10 per cartridge, how many cartridges will be sold at \$20 per cartridge?

**Problem 4.** Let  $s$  be same function as in problem 3.

- What is the domain of  $s$ ?
- What is the range of  $s$ ?
- Does  $s$  have a vertical or horizontal asymptote?

**Problem 5.** The sum of the squares of two consecutive real numbers is 61. Find the numbers.

**Problem 6.** Find all real solution to the rational equation.

$$\frac{2}{x+1} - \frac{1}{x-2} = -1$$

**Problem 7.** Find all real solution to the irrational equation.

$$\sqrt[n]{2x+1} - \sqrt[n]{x^2+4x+1} = 0.$$

where  $n$  is any positive integer.