Name:

The Final Quiz

Complete the following problems to the best of your ability. **SHOW ALL OF YOUR WORK.** Unshown work will not be graded. You may use a calculator.

1. Let $f(x) = x^2 - 2x$, $g(x) = 2x + 4$, and $h(x) = e^{-x}$. Find the following functions.

   (a) $(f + g)(x)$

   (b) $(gh)(x)$

   (c) $(\frac{g}{f})(x)$

2. Circle which of the following are power functions.

   $2x + 3$ $\quad$ $3x^4$ $\quad$ $2 \cdot 3^x$ $\quad$ $5\sqrt[3]{x}$

3. The volume of a cylinder is given by $V = \pi r^2 h$, where h is the height of the cylinder and r is the radius.

   (a) If we multiply the height of a cylinder by 3, what happens to the volume?

   (b) If we multiply the radius of a cylinder by 1/2, what happens to the volume?

4. Oh boy oh boy it's the fence problem again. The setup is with the cliff on the top (check the board!), and the farmer has 1000m of fencing this time.

   (a) Find a function giving the area of the pen in terms of x, the width (consult the board to know which side is x).

   (b) What dimensions will result in the maximum area of the pen?

   (c) What is the maximum area of the pen?