Midterm 1 (Practice)

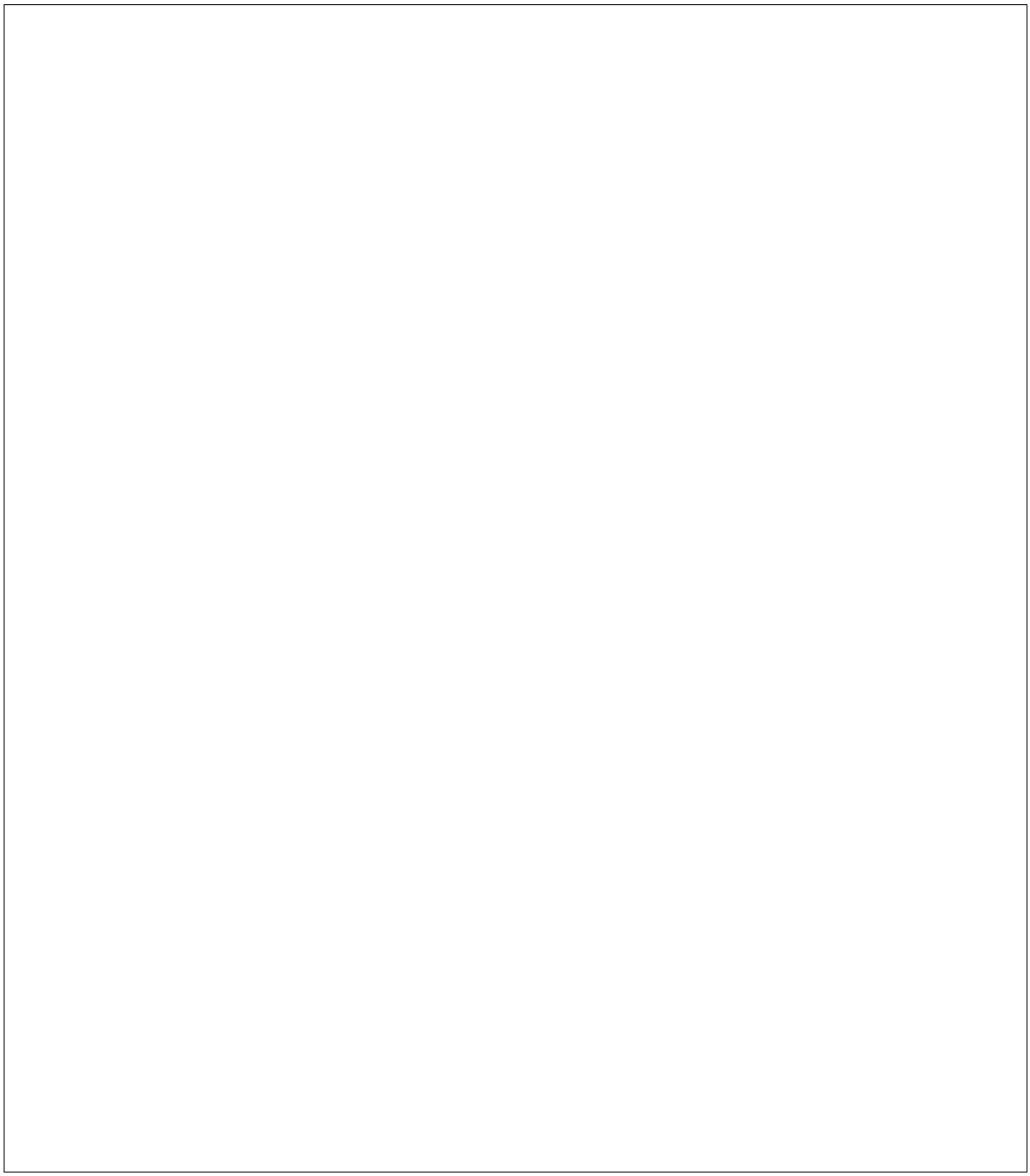
There are 11 problems worth 10 points each. A score of above 100 is possible on this midterm. Show all of your work for full credit.

1. Simplify the expression as much as possible.

$$\sqrt[4]{8x^6y^2}\sqrt[4]{2x^2y^2}$$

2. Factor the below expression (hint: grouping).

$$x^5 + x^4 + x + 1$$



3. Simplify the following expression as much as possible.

$$\frac{x+3}{4x^2-9} \div \frac{x^2+7x+12}{2x^2+7x-15}$$

4. Find all real solutions to

$$\frac{3}{x+1} - \frac{1}{2} = \frac{1}{3x+3}.$$

5. Find the roots of

$$x^2 - 6x + 1 = 0$$

by completing the square. Maximum of half credit if you use another method.

6. Solve the inequality

$$\frac{1+x}{1-x} \geq 1.$$

7. Find the equation of the line that goes through the point $(-2, 1)$ and is perpindicular to the line $3x + 4y + 7 = 0$.

8. Determine whether the function

$$f(x) = \frac{e^x + e^{-x}}{e^x - e^{-x}}$$

is odd, even, or neither.

9. Consider the function $f(x) = x^2$. Write down an expression for the function after it is shifted to the left by 2 units and then reflected about the x-axis.

10. Consider $f(x) = \sqrt{x} + 1,\ g(x) = x - x^2$. Compute $f(g(x))$ and find its domain.

11. Find the inverse of the function

$$f(x) = (x+1)^3.$$