

Please show all work and **box your final answers**. If you need more room, you may use the backs of the pages. Calculators are not allowed and cellphones should be put away. Good luck!

1. Multiply the following expressions.

(a) (4 points)  $x^{3/2} \left( \sqrt{x} - \frac{1}{\sqrt{x}} \right)$

(b) (4 points)  $(\sqrt{h^2 + 1} + 1)(\sqrt{h^2 + 1} - 1)$

2. Factor the following expressions completely.

(a) (4 points)  $9x^2 - 36x - 45$

(b) (4 points)  $3x^3 - x^2 - 12x + 4$

3. Rewrite the following expressions as one simplified fraction.

(a) (4 points)  $\frac{\left(\frac{2x^2 - 3x - 2}{x^2 - 1}\right)}{\left(\frac{2x^2 + 5x + 2}{x^2 + x - 2}\right)}$

(b) (4 points)  $\frac{1}{x + 1} - \frac{2}{x^2 + 2x + 1} + \frac{3}{x^2 - 1}$

4. (4 points) Use interval notation to describe the domain of the following expression.

$$\frac{\sqrt{3-x}}{x^2+3x+2}$$

5. Solve the following equations.

(a) (4 points)  $\frac{4}{x-1} + \frac{2}{x+1} = \frac{35}{x^2-1}$

(b) (4 points)  $\frac{10}{x} - \frac{12}{x-3} = -4$

6. Use interval notation to describe the solution set of the following inequalities.

(a) (4 points)  $(x + 3)^2(x - 2)(x + 5) \geq 0$

(b) (4 points)  $1 + \frac{2}{x + 1} \leq \frac{2}{x}$

(c) (4 points)  $|8x + 3| > 12$