

Due at the beginning of class Thursday, October 6. Write your solutions on separate paper (no ragged edges, please) with multiple pages stapled. Have it ready to turn in at the beginning of class.

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1. Simplify each fraction by cancelling a common factor.

Hint: It's helpful to consider the zeros of the denominators.

a.  $\frac{x^3 - x - 6}{(x - 2)}$

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

c.  $\frac{x^3 - 10x + 24}{x^2 - 16}$

2. Simplify each complex fraction.

a.  $\frac{\frac{1}{x+4} - \frac{1}{x}}{4}$

b.  $\frac{\frac{1}{x^2} - \frac{1}{y^2}}{x - y}$

c.  $\frac{\frac{1}{x + \Delta x} - \frac{1}{x}}{\Delta x}$

3. Expand the following products and simplify the result by combining like terms.

a.  $(3 - \sqrt{x})(3 + \sqrt{x})$

b.  $(\sqrt{2} + \sqrt{z})(\sqrt{2} - \sqrt{z})$

c.  $(\sqrt{x - \Delta x} - \sqrt{x})(\sqrt{x - \Delta x} + \sqrt{x})$

4. Evaluate each of the following limits (without referring to a graph).

(All of these limits do exist.)

a.  $\lim_{x \rightarrow 1} x^2 - 2(x + 1)$

b.  $\lim_{x \rightarrow 0} \frac{x + 6}{(x - 1)(x - 2)}$

c.  $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x - 1}$