Name: _____

Write all of your responses on these exam pages, use the back if necessary. Show all your work, answers without supporting justification will not receive credit. Each exercise is worth 20 points.

1. Find the following limit using limit laws. Keep your answer in exact form.

$$\lim_{x \to -2} \frac{x^2 - x - 6}{3x^2 + 5x - 2}$$

2. Find the following limit using limit laws. Keep your answer in exact form.

$$\lim_{x\to\infty} \frac{x - x^3}{2 - x^2 + 3x^3}$$

3. Explain why the function

$$f(x) = \frac{\cos(x^2)}{1 - e^x}$$

is continuous at every number in its domain and state the domain.

4. State the following definitions,

   (a) State the definition of the derivative of a function $f(x)$ at the point $x = a$, that is, $f'(a)$.

   (b) State the definition of the derivative of a function $f(x)$, that is, $f'(x)$.

5. Use the definition of the derivative to find the derivative of the function,

$$f(x) = \frac{1}{x^2 - 4}$$