Math 2143 - Brief Calculus with Applications

Test #3 - 2014.11.19

Name: _____

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1. Compute the following limit:

$$\lim_{h \to 4} \frac{(h+2)^2 - 9h}{h-4}$$

2. Compute the following limit:

$$\lim_{x \to 2} \frac{x-2}{x^3 - 4x}$$

3. Find the equation of the tangent line to the function $f(x) = e^{3x} + x$ at $x = 1$. Do not attempt to approximate any values.

4. Compute the following derivative:

$$\frac{d}{dx}\frac{3x^2 - 4x + 2}{2e^{\frac{1}{2}x} - x^2\ln(x)}$$

5. Compute the following derivative:

$$\frac{d}{dx}2^{x^2+3^x}$$

6. Compute $\frac{dy}{dx}$ if $x + y = \ln(x + y^2)$.

7. Consider the function $f(x) = \dfrac{1}{x} + \dfrac{1}{x^2}$.

   (a) What is the domain of $f(x)$?

   (b) Locate the roots of $f(x)$.

   (c) Determine the locations of all vertical asymptotes.

   (d) Determine the locations of all horizontal asymptotes.

(e) Compute $f'(x)$.

(f) Determine the critical points of $f(x)$ using $f'(x)$.

(g) Compute the intervals of increase and decrease using $f'(x)$.

(h) Classify the critical points from part (f) as local/global maximums and minimums using your answers from part (g).

(i) Sketch the graph of $f(x)$ using all of the information from parts (a)–(h).