Chapter 5 Review [Some problems to ponder]

Non-calculator problems:

If $f(x) = \tan\left(e^{2x}\right)$, then $f'(x) =$

If $F(x) = \int_{e^3}^{x} \frac{10}{25 + \ln(2t)}\, dt$, then $F'(e^3) =$

Find the average value of $f(x) = \frac{1}{9 + x^2}$ for the closed interval [0, 3]

$$\int_{e}^{e^3} \frac{dx}{x \ln x}$$

If $f(x) = \tan x + e^{-x^2}$, then $f''(0) =$

If $f(x) = \dfrac{e^{-x^2}}{x^2 + 1}$, then $f'(1) =$

For $x>0,\ f'(x)=\dfrac{1+\ln x}{x^2+3}$. Find all intervals for which $f(x)$ is increasing.

Calculator problems

If $f'(x)=\ln\left(5+e^x\right)$ and $f(0)=10$, then $f(12)=$

Let $f(x)=7x^2-5x+3$ and let g be the inverse function of f. What is the value of $g'(21)$?

Free Response Problems to consider:

[These are on your Chapter 5 handout]

2003AB 4B [non-calculator]

A particle moves along the $x-$axis with velocity at time $t \geq 0$ given by $v(t) = -1 + e^{1-t}$

(a) Find the acceleration of the particle at time $t = 3$

(b) Is the speed of the particle increasing at time $t = 3$? Justify your answer [using Calculus!]

(c) Find all values of t at which the particle changes direction. Justify your answer [using Calculus!]

(d) Find the total distance traveled by the particle over the time interval $0 \leq t \leq 3$.

2007 AB 6 [non-calculator]

Let f be the function defined by $f(x) = k\sqrt{x} - \ln x$ for $x > 0$, where k is a positive constant

(a) Find $f'(x)$ and $f''(x)$

(b) For what value of the constant k does f have a critical point at $x = 1>$
For this value of k, determine whether f has a relative maximum, relative minimum, or neither at $x = 1$. Justify your answer.

(c) For a certain value of the constant k, the graph of f has a point of inflection on the $x-$axis. Find this value of k.