Exam 1 Feb 22, 2007 SHOW ALL WORK

Math 25 Calculus I Either circle your answers or place on answer line.

Find the following derivatives (you do not need to simplify):

[14] 1.) $\frac{d}{dx}[\frac{x^2+3\sqrt{x}+x}{2x^4-5}]$

Answer 1.) ____________________

[14] 2.) $\frac{d}{dx}[2xe^x + 3\sqrt{x^5} - \frac{1}{x}]$

Answer 2.) ____________________

3.) Calculate the appropriate limits in order to find the equations of all vertical and horizontal asymptotes for $f(x) = \frac{\sqrt{x^2+1}}{2(x-3)}$. Show ALL steps.

[12] horizontal asymptotes) ______________________________

[10] vertical asymptotes) ______________________________

[10] 4a.) Find the derivative of $f(x) = 2x + 3$ by using the definition of derivative.

$f'(x) =$ ______________

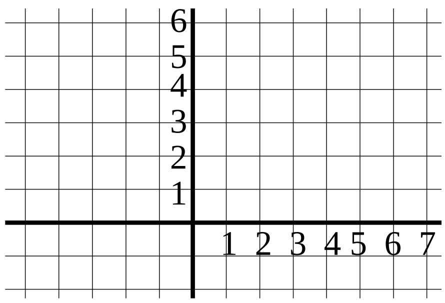
[3] 4b.) Find the **equation** of the tangent line to the curve $f(x) = 2x + 3$ when $x = 1$.

[10] 5.) Express the given quantity as a single logarithm.:

$$a\ ln(x) + b\ ln(y) - c\ ln(z) - d\ ln(1) = \rule{5cm}{0.4pt}$$

[7] 6.) Sketch the graph of a function with the following properties:

$lim_{x \to 2^+} f(x) = +\infty$,
$lim_{x \to +\infty} f(x) = 0$,
$lim_{x \to -\infty} f(x) = 5$
$f'(-3) = 1, f'(0) = 0, f'(1) = -4$



7.) If a ball is thrown vertically upward with a velocity of 16 ft/sec, then its height (in feet) is given by $s(t) = 16t - 16t^2$.

[7] 7a.) What is the maximum height reached by the ball? ______________

[3] 7b.) Find a point $(t_0, s(t_0))$ at which the slope of the tangent line to the curve $s(t) = 16t - 16t^2$ is equal to 0: $(t_0, s(t_0)) =$ ______________

[10] **Choose either problem 8 or 9. You may do both problems for up to 4 points extra credit.**

8.) Let $f : R \to R$, $f(x) = (x - 3)^2$.

8a.) Is f 1:1? _______. If f is not 1:1, prove it.

b.) Is f onto? _______. If f is not onto, prove it.

9a.) State the Intermediate Value Theorem.

9b.) Use the Intermediate Value Theorem to show that $\sqrt{x} - 3 = 0$ has a root between 4 and 16.