

Name: _____

Directions: Complete all questions and **show all applicable work.** Partial credit will be given.

1.) [13pts] Using the definition of the derivative, show that the slope of the line $y = mx + b$ is in fact m .

2.) [13pts] Draw a function $f(x)$ that satisfies the following properties. Also specify what each item tells about the function $f(x)$ in words.

(a) $f(0) = 1$

(b) $f(2) = -3$

(c) $f'(1) = 0$

(d) $f'(x) \leq 0$ for all x

(e) $f''(x) > 0$ for $x < 0$

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3.) [13pts] Calculate the derivative for each of the following.

(a) $\frac{1}{5}x^5 + 2x^2 + 8x^{\frac{1}{2}} + 23$

(b) $x^2 \ln(x)$

4.) [13pts] Calculate the derivative for each of the following.

(a) $\sin(e^x)$

(b) $\arctan(\sqrt{1-x})$

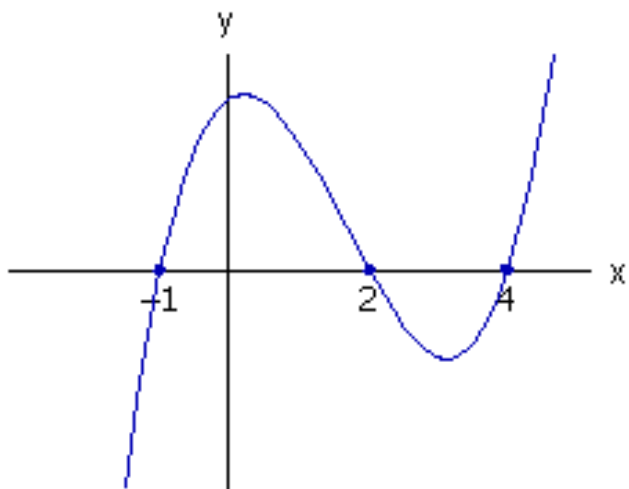
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5.) [13pts] Given $e^y + x^2y = \cos(x)$, calculate $\frac{dy}{dx}$.

6.) [13pts] Compute the following. You must show appropriate work to receive credit (no calculators):
 $\sin\left(\tan^{-1}\left(\frac{5}{12}\right)\right)$

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7.) [13pts] Using the graph below of $f'(x)$, sketch a graph of $f(x)$.



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8.) [9pts] Prove that the derivative of $\sin^{-1}(x)$ is $\frac{1}{\sqrt{1-x^2}}$.