Tangent Line

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To find the equation of a tangent line to a function at a point:

1. You may have to find the y-value of the point on the graph by substituting in the given x-value into the original equation.
2. Find the derivative of f.
3. Evaluate $f'(x)$ to get the slope of the graph....must be a number!!!
4. Substitute the given point and the slope of the derivative at that x-value into the point-slope formula.

**1. Let f be the function defined by $f(x) = 4x^3 - 5x + 3$. Find the equation of the line tangent to the graph of f at $x = -1$.

$f'(x) = 12x^2 - 5$

$f'(-1) = 12 - 5 = 7$

$f(-1) = 4(-1)^3 - 5(-1) + 3$

$= -4 + 5 + 3 = 4$

$y - 4 = 7(x+1)$

$y = 7x + 11$

2. Using the table below, find the equation of the line tangent to $h(x)$ at $x = 8$, provided $h(x)$ is a differentiable function.

x	$g(x)$	$h(x)$	$g'(x)$	$h'(x)$
8	-3	9	5	-4

$h(8) = 9$

$h'(8) = -4$

$y - 9 = -4(x - 8)$

$-4x + 32$

$y = -4x + 41$

**3. If the line tangent to the graph of the function f at the point (1, 7) passes through the point (-2, -2), then $f'(1) = ?$

$$\frac{7+2}{1+2} = \frac{9}{3} = 3$$

**(calc.) 4. Find the equation of the line tangent to the graph of $f(x) = x^4 + 2x^2$ at the point where $f'(x) = 1$.

$f'(x) = 4x^3 + 4x = 1$

$4x^3 + 4x - 1 = 0$

$x = .237$

$f(.237) = .115$

$y - .115 = x - .237$