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OH: M 11-12pm / **ML:** Th 1-3pm

3. Find the equation of the tangent line to the curve $f(x) = -x^2 + 4x$ at the point $(2, 4)$ by using the definition of the derivative. Sketch a graph to check your answer.

If you have time, use the derivative definition to find $f'(x)$ for all x, and sketch part of its graph.

$$f'(2) = \lim_{h \to 0} \frac{[-(2+h)^2 + 4(2+h)] - 4}{h}$$

$$= \lim_{h \to 0} \frac{[-(4 + 4h + h^2) + (8 + 4h)] - 4}{h}$$

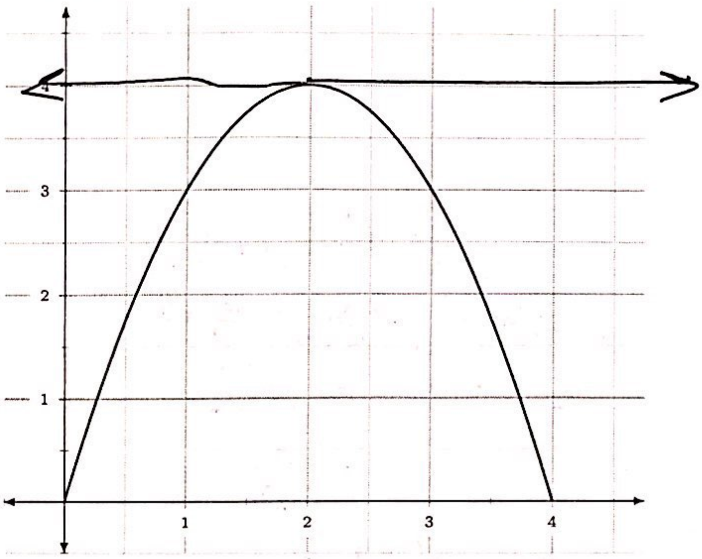
$$= \lim_{h \to 0} \frac{8 - 4 - 4 + 4h - 4h - h^2}{h}$$

$$= \lim_{h \to 0} \frac{-h^2}{h} = \lim_{h \to 0} \frac{h}{1}$$

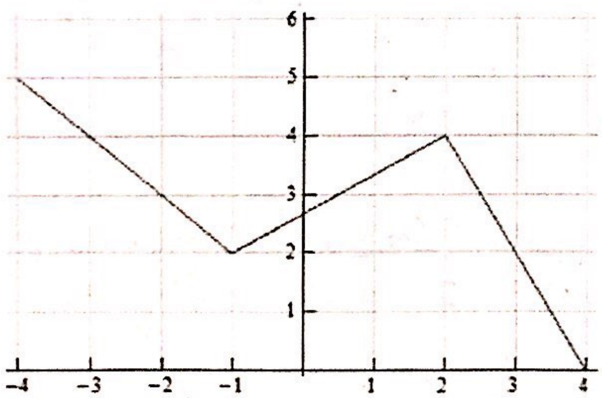
$$= 0$$

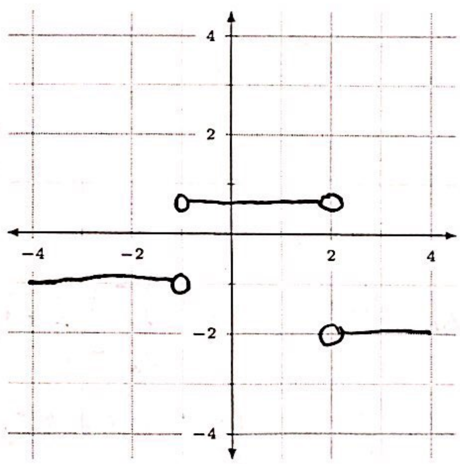
So, $m = \text{slope} = 0$

equation of tangent line: $y - 4 = 0(x-2) \Rightarrow \boxed{y = 4}$



4. Sketch the derivative of the graph of $f(x)$ depicted below.





Discuss: If $f(x)$ above is the derivative of some function $g(x)$ so that $g'(x) = f(x)$, what might the graph of $g(x)$ look like?