Key

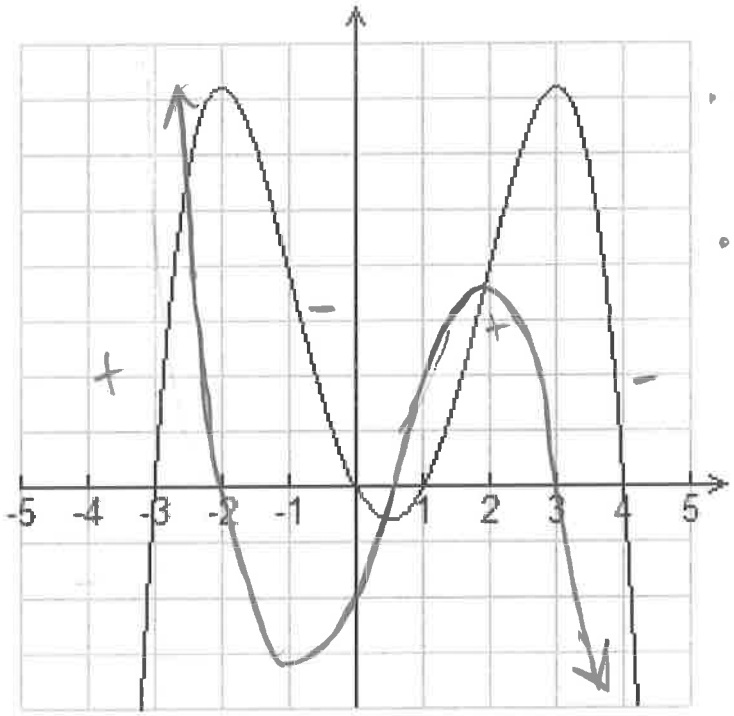
Math 4

Name_____

5-4 Practice 3

Date_____

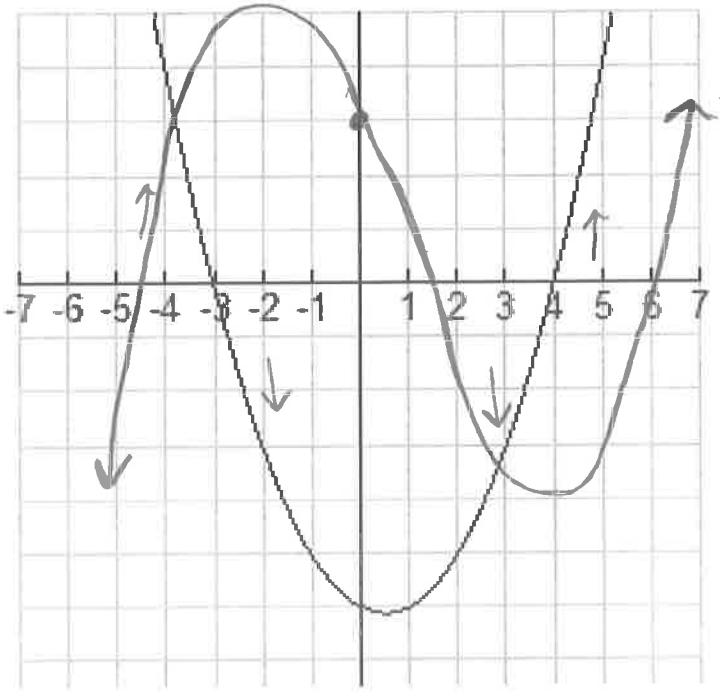
1. The graph of $f(x)$ is given below. Sketch a possible $f'(x)$. → cubic!



- Zeroes at the max/mins.
- $f'(x) > 0$ when $f(x)$ incr.
- $f'(x) < 0$ when $f(x)$ decr.
- We don't know y-coord of max/mins of $f'(x)$!

→ cubic

2. The graph of $f'(x)$ is given below. Sketch a possible $f(x)$ if the point (0, 3) is on $f(x)$.



- Max/mins when $f'(x) = 0$
- $f(x)$ incr when $f'(x) > 0$
- $f(x)$ decr when $f'(x) < 0$
- We don't know y-coord for max/mins of $f(x)$!

3. Find the equation of the tangent line for $f(x) = 3x^2 - 5x + 1$ at $x = 2$.

$f(2) = 3(2)^2 - 5(2) + 1 = 12 - 10 + 1 = 3$

$(2, 3)$

$f'(x) = 6x - 5$

slope $= f'(2) = 6(2) - 5 = 7$

$\boxed{y - 3 = 7(x - 2)}$

or

$3 = 7(2) + b$

$-11 = b$

$\boxed{y = 7x - 11}$

4. Find the derivative of the $f(x)$ function from #3 by using the definition of the derivative.

$$= \lim_{\Delta x \to 0} \frac{3(x + \Delta x)^2 - 5(x + \Delta x) + 1 - (3x^2 - 5x + 1)}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{3x^2 + 6x\Delta x + 3\Delta x^2 - 5x - 5\Delta x + 1 - 3x^2 + 5x - 1}{\Delta x}$$

$$= \lim_{\Delta x \to 0} \frac{6x\Delta x + 3\Delta x^2 - 5\Delta x}{\Delta x}$$

$$= \lim_{\Delta x \to 0} 6x + 3\Delta x - 5$$

$$= \boxed{6x - 5}$$