Chapter 3 Quiz 1 Outline:

1. DEF. OF DERIVATIVE : $f' = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

2. SLOPES | EQUATIONS OF TAN6. LINES.

3. DIFF. RULES
   POWER RULE | PRODUCT | QUOTIENT

4. GRAPH f'

5. NUMERICAL PROBLEMS. (p149 #31)

6. HIGHER ORDER DERIVATIVES

Find the equation of the tangent line for $f(x)=\dfrac{1}{x^2+4}$ at $x = 1$.

Use the definition of the derivative.

$$f' = \lim_{h\to 0} \frac{\dfrac{1}{(x+h)^2+4} - \dfrac{1}{x^2+4}}{h}$$

$$= \lim_{h\to 0} \frac{x^2+4-\left((x+h)^2+4\right)}{h\left((x+h)^2+4\right)(x^2+4)}$$

$$= \lim_{h\to 0} \frac{x^2+4-x^2-2xh-h^2-4}{h\left((x+h)^2+4\right)(x^2+4)}$$

$$= \lim_{h\to 0} \frac{h(-2x-h)}{h\left((x+h)^2+4\right)(x^2+4)}$$

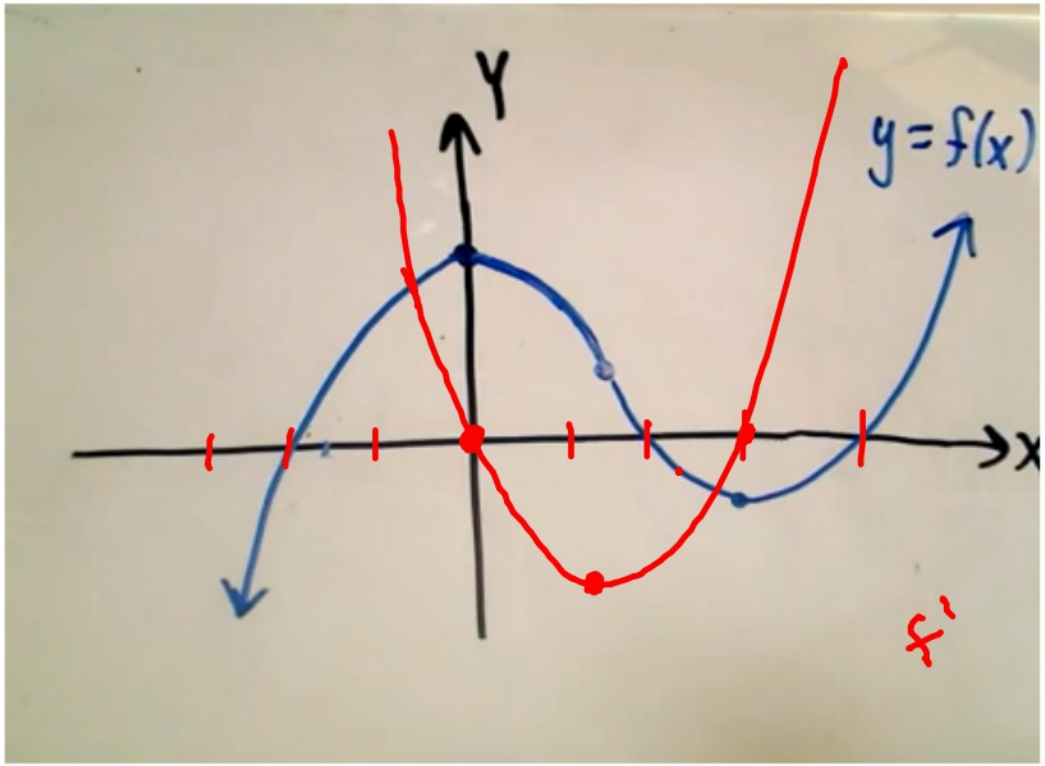
$$= \frac{-2x-0}{\left((x+0)^2+4\right)(x^2+4)} = \boxed{\frac{-2x}{(x^2+4)^2} = f'}$$

$f(1) = \frac{1}{5} \Rightarrow (1, 1/5)$ point

$f'(1) = \frac{-2}{25} = m$

$$\boxed{y - 1/5 = \frac{-2}{25}(x-1)}$$

Sketch the graph of f'



-3	5
-2	2
-1	1
0	0
1	-1
2	-1
3	0
4	1