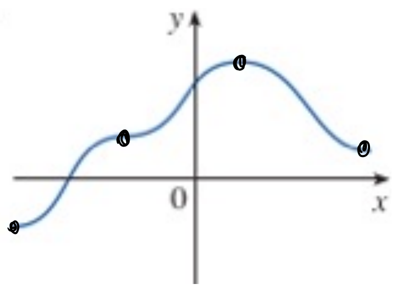
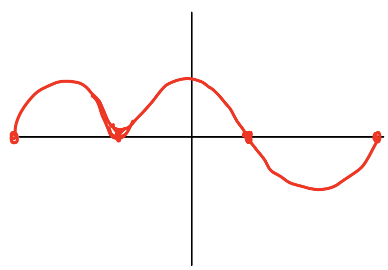
Math 1171

Homework #4

#8, 21, 31c, 45

#8





#21 $f(t) = 2.5t^2 + 6t$

$$f'(t) = \lim_{h \to 0} \frac{2.5(t+h)^2 + 6(t+h) - (2.5t^2 + 6t)}{h}$$

$$= \lim_{h \to 0} \frac{2.5(t^2 + 2th + h^2) + 6t + 6h - 2.5t^2 - 6t}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{2.5t^2} + 5th + 2.5h^2 + \cancel{6t} + 6h - \cancel{2.5t^2} - \cancel{6t}}{h}$$

$$= \lim_{h\to 0} \frac{5th + 2.5h^2 + 6h}{h}$$

$$= \lim_{h\to 0} \frac{\cancel{h}(5t + 2.5h + 6)}{\cancel{h}}$$

$$= \lim_{h\to 0} 5t + 2.5h + 6 = \boxed{5t+6}$$

#31c $\quad f(x) = 1 + \sqrt{x+3}$

$$f'(x) = \lim_{h\to 0} \frac{1+\sqrt{x+h+3} - (1+\sqrt{x+3})}{h}$$

$$= \lim_{h\to 0} \frac{1+\sqrt{x+h+3} - 1 - \sqrt{x+3}}{h}$$

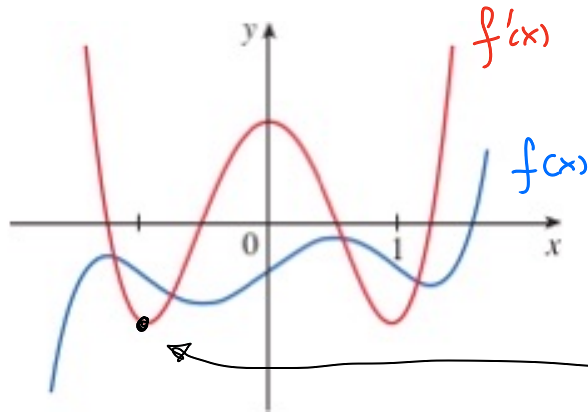
$$= \lim_{h\to 0} \frac{\sqrt{x+h+3} - \sqrt{x+3}}{h} \cdot \frac{\sqrt{x+h+3} + \sqrt{x+3}}{\sqrt{x+h+3} + \sqrt{x+3}}$$

$$= \lim_{h\to 0} \frac{(x+h+3) - (x+3)}{h(\sqrt{x+h+3} + \sqrt{x+3})} = \lim_{h\to 0} \frac{\cancel{h}}{\cancel{h}(\sqrt{x+h+3} + \sqrt{x+3}}$$

$$= \lim_{h\to 0} \frac{1}{\sqrt{x+h+3} + \sqrt{x+3}} = \frac{1}{\sqrt{x+3} + \sqrt{x+3}}$$

$$= \frac{1}{2\sqrt{x+3}}$$

#



The red one is f', since it equals zero whenever the slope of the blue one is zero.

looks like $f'(-1) = -1$. (this y-value)

$f''(1)$ would be the slope of f' when $x=1$, which is 0.

So $f'(-1) = -1$,

$f''(1) = 0$

So $f''(1)$ is bigger.