TANGENTS HOMEWORK

§2.7 #20 p. 156 The expression below is $f'(a) = \lim_{h \to 0} \left[\frac{f(a+h) - f(a)}{h} \right]$ identify f and a. That is figure out what derivative this is;

$$\lim_{h \to 0} \frac{\sqrt[4]{16+h} - 2}{h} = \lim_{h \to 0} \frac{\sqrt[4]{16+h} - \sqrt[4]{16}}{h}$$

clearly $f(x) = \sqrt[4]{x}$ and $a = 16$

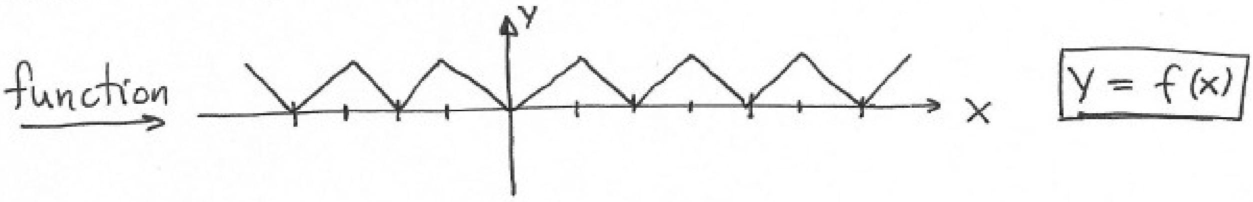
That is $f'(16) = \lim_{h \to 0} \frac{\sqrt[4]{16+h} - 2}{h}$

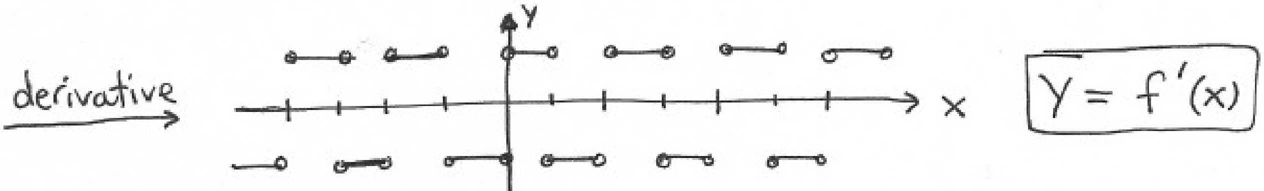
§2.7 #22 p. 156 Again figure out which derivative in disguise this is.

$\lim_{x \to \frac{\pi}{4}} \left(\frac{\tan(x) - 1}{x - \pi/4} \right)$ has the form $\lim_{x \to a} \left(\frac{f(x) - f(a)}{x - a} \right) = f'(a)$

Its easy to see that $a = \pi/4$ and $f(x) = \tan(x)$.

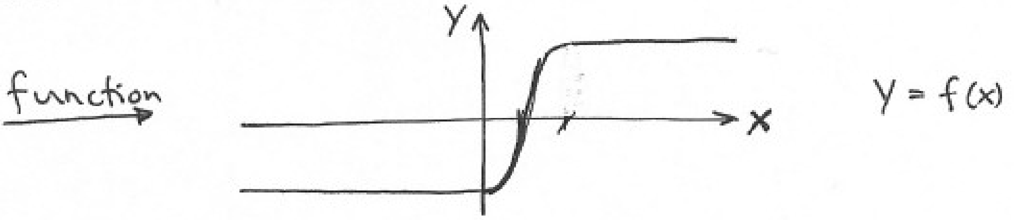
§2.8 #6 p. 167-168 Sketch the function given in text and it's derivative in a graph with same x-calibration below it,

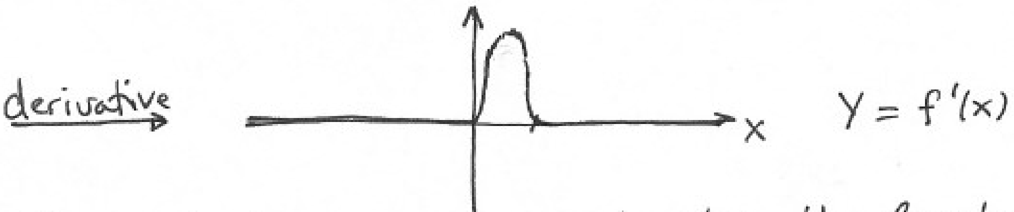




(all circles are open because the derivative isn't defined at these points.)

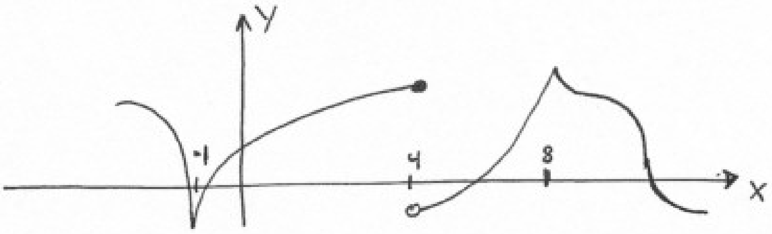
§2.8 #8 p. 168 Again Sketch function with its derivative





- The derivative is non-zero only when the function is changing.

§2.8 #31 p.169 | State where and why f is not differentiable



the slope from left is negative at $x=-1$ whereas the slope from right at $x=-1$ is positive thus there is no slope at $x=-1$. That is there is no tangent line at $x=-1$. A similar comment applys to $x=8$.

f is not differentiable at $x=4$ because f is not continous at $x=4$. We should know a function must be continous in order to be differentiable.

- Graphically: just look for discontinuities and kinks.

§2.8#32 p.169 | Same ideas as in #31 oops I meant to do this one ü

§2.8#38 p.170 | See the figure in the text

$f(t)$ is the position
$f'(t)$ is the velocity
$f''(t)$ is the acceleration
$f'''(t)$ is th jerk

The slope of the position graph should be given by the velocity graph. The slope of the velocity graph should be given by the acceleration graph. The slope of the acceleration graph should be given by the jerk graph.

TRY some guesses and you'll be forced to conclude:

$y=f(t)$ is d - position
$y=f'(t)$ is c - velocity
$y=f''(t)$ is b - acceleration
$y=f'''(t)$ is a - jerk