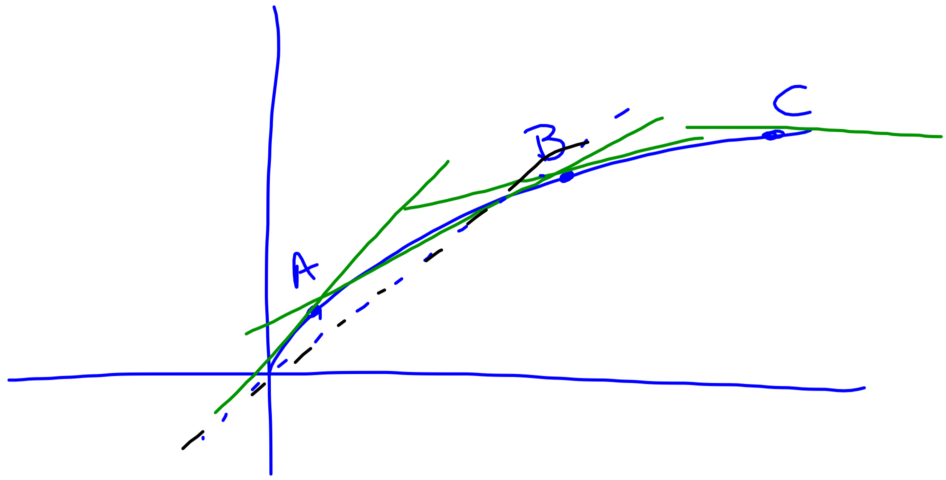
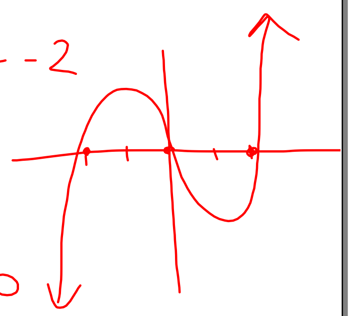


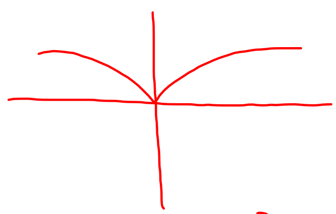
0 C B AB 1 A

39.

21. $f(x) = x^3 - 4x$ $\quad x = -2$



23. $f(x) = x^{\frac{2}{3}}$ $\quad @\ x = 0$

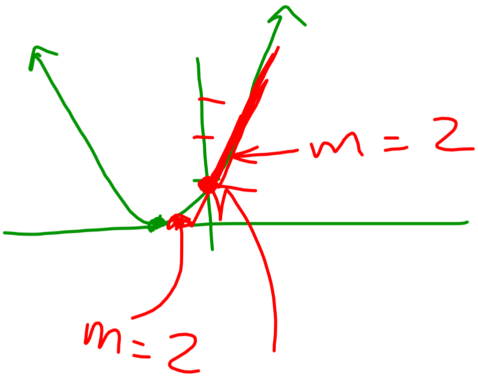


27. $\frac{(0+h)^{\frac{2}{3}} - 0}{h} = \frac{h^{\frac{2}{3}}}{h} =$

35. $h^{-\frac{1}{3}} = \frac{1}{h^{\frac{1}{3}}} \cdot \frac{h^{\frac{2}{3}}}{h^{\frac{2}{3}}} = \frac{h^{\frac{2}{3}}}{h}$

35.

$$g(x) = \begin{cases} (x+1)^2 & x \le 0 \\ 2x+1 & 0 < x < 3 \\ (4-x)^2 & x \ge 3 \end{cases}$$



39.

$$f(x) = \begin{cases} 3-x & x < 1 \\ ax^2+bx & x \ge 1 \end{cases}$$

$$-2 = -a + b$$

$$-1 = 2a + b$$

$$-3 = a$$

$$5 = b$$

3.3a Rules for Differentiation

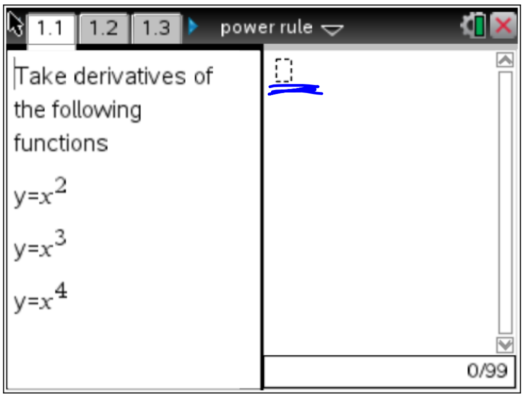
f(x) = 5 $f'(x) = 0$

f(x) = -3 $f'(x) = 0$

$$\frac{d}{dx}c = 0$$

Use power rule.tns to discover the power rule for derivatives.

$2x$
$3x^2$
$4x^3$



$$\boxed{\frac{d}{dx}\left(x^n\right) = n \cdot x^{n-1}}$$

$$\frac{d}{dx}\left(3x^4\right) = 12x^3$$

Proof of the Power Rule

find $\frac{dy}{dx}$ if $y = x^3 + 6x^2 - \frac{5}{3}x^1 + 16$

$$\frac{dy}{dx} = 3x^2 + 12x - \frac{5}{3} + 0$$

$$y' = 3x^2 + 12x - \frac{5}{3}$$

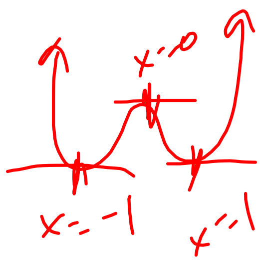
$$\frac{d}{dx}\left(\frac{1}{x}\right) = \frac{d}{dx}\left(x^{-1}\right) = -1x^{-2} = -\frac{1}{x^{2}}$$

$$\frac{d}{dx}\left(x^{\frac{5}{3}}\right) = \frac{5}{3}x^{\frac{2}{3}}$$

$$\frac{d}{dx}\left(x^{\frac{2}{5}}\right) = \frac{2}{5}x^{-\frac{3}{5}} = \frac{2}{5x^{\frac{3}{5}}}$$

find horizontal tangent of $$y = x^4 - 2x^2 + 2$$

$$y' = 4x^3 - 4x = 0$$



$$4x(x^2 - 1) = 0$$

$$4x(x+1)(x-1) = 0$$

$$x = -1, 1, 0$$

higher order derivatives:

$$y = x^4 - 2x^2 + 2$$

$y' = 4x^3 - 4x$ velocity

$y'' = 12x^2 - 4$ acceler.

$y''' = 24x$ jerk