

March 18

What are the different notations
for the derivative?

$$\frac{d}{dx} (y)$$

$$\frac{dy}{dx}$$

$$f'(x)$$

$$y'$$

$$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$g'(x)$$
$$h'(x)$$

March 17

Students will verbally explain how to
take multiple derivatives of the
same function

(using the words:
first, power rule, derivative...)

| First Derivative | Second Derivative | Third Derivative | n th Derivative |
|------------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------------|
| $f'(x)$ $\frac{dy}{dx}$ y' | $\frac{d^2 y}{(dx)^2}$ y'' $f''(x)$ | $f'''(x)$ $\frac{d^3 y}{dx^3}$ y''' | $f^{(n)}(x)$ $\frac{d^n y}{dx^n}$ $y^{(n)}$ |



$$y = 4x^6 - 7x^3 + 15x$$

Find the first four derivatives

$$y' = 4(6x^5) - 7(3x^2) + 15(1x^0)$$

$$y' = 24x^5 - 21x^2$$

$$y'' = 24(5x^4) - 21(2x)$$

$$y'' = 120x^4 - 42x$$

$$y''' = 120(4x^3) - 42(1x^0)$$

$$y''' = 480x^3 - 42$$

$$y^{(4)} = 480(3x^2) - 42(0x^{-1})$$

$$y^{(4)} = 1440x^2$$

$$y = x^{-2} + 10x$$

find the first
three derivatives

$$y' = -2x^{-3} + 10$$

$$y'' = -2(-3x^{-4})$$

$$y'' = 6x^{-4}$$

$$y''' = -24x^{-5}$$

$$y = \sqrt{x} - 5x^3 - 12x$$

find the first
two derivatives

$$y = x^{\frac{1}{2}} - 5x^3 - 12x$$

$$y' = \frac{1}{2}x^{-\frac{1}{2}} - 5(3x^2) - 12$$

$$y' = \frac{1}{2}x^{-\frac{1}{2}} - 15x^2 - 12$$

$$y'' = \frac{1}{2}\left(-\frac{1}{2}x^{-\frac{3}{2}}\right) - 15(2x) - 0$$

$$y'' = -\frac{1}{4}x^{-\frac{3}{2}} - 30x$$