AP Calculus AB
Tuesday, September 17, 2013

Find f'(x) if f(x) = -4/x

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

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

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

$$f'(x) = \lim_{h\to 0} \frac{-4x + 4(x+h)}{x(x+h)\cdot h}$$

$$f'(x) = \lim_{h\to 0} \frac{-4x+4x+4h}{xh(x+h)}$$

$$f'(x) = \lim_{h\to 0} \frac{4\cancel{h}}{x\cancel{h}(x+h)}$$

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

$$f(x) = \frac{-4}{x}$$

$$f'(x) = \frac{4}{x^2}$$

⑧ $f(x)=\sqrt{x}$

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

⑦ $f(x)=\frac{-1}{x^2}$

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

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

$$f'(x)=\lim_{h\to 0}\frac{\cancel{-x^2}+\cancel{x^2}+2xh+h^2}{x^2h(x+h)^2}$$

$$f'(x)=\lim_{h\to 0}\frac{\cancel{h}(2x+h)}{x^2\cancel{h}(x+h)^2}$$

$$f'(x)=\lim_{h\to 0}\frac{2x+h}{x^2(x+h)^2}=\frac{2x}{x^2\cdot x^2}=\frac{2}{x^3}$$

$$f(x)=\frac{-1}{x^2}\longrightarrow f'(x)=\frac{2}{x^3}$$

Find $f'(x)$ if $f(x) = \dfrac{1}{\sqrt{x}}$

Make sure you can do this problem!

	$f(x)$	$f'(x)$
①	$2x$	2
②	x^2-5	$2x$
③	x^2+3x-4	$2x+3$
④	$4x^2-6x+1$	$8x-6$
⑤	x^3+2x	$3x^2+2$
⑥	$\frac{5}{x}+1 \quad 5x^{-1}+1$	$\frac{-5}{x^2}=-5x^{-2}$
⑦	$\frac{-1}{x^2}$	$\frac{2}{x^3}$
⑧	$\sqrt{x} \quad x^{1/2}$	$\cancel{\frac{1}{2\sqrt{x}}} \quad \frac{1}{2}x^{-1/2}$
⑨	x^4-5x^2	$4x^3-10x$
⑩	$2x^3-3x+1$	$6x^2-3$
⑪	$x^{1/3}$	$\frac{1}{3}x^{-2/3}=\frac{1}{3\sqrt[3]{x^2}}$
⑫	$3x^4-7x^2$	$12x^3-14x$
⑬	$1x^{\pi}$	$\pi x^{\pi-1}$

Power Rule

Today: Rules 1-5

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

The derivative of c is 0.

p.36-37 (1-5)

p.39: 1-15