WARM-UP

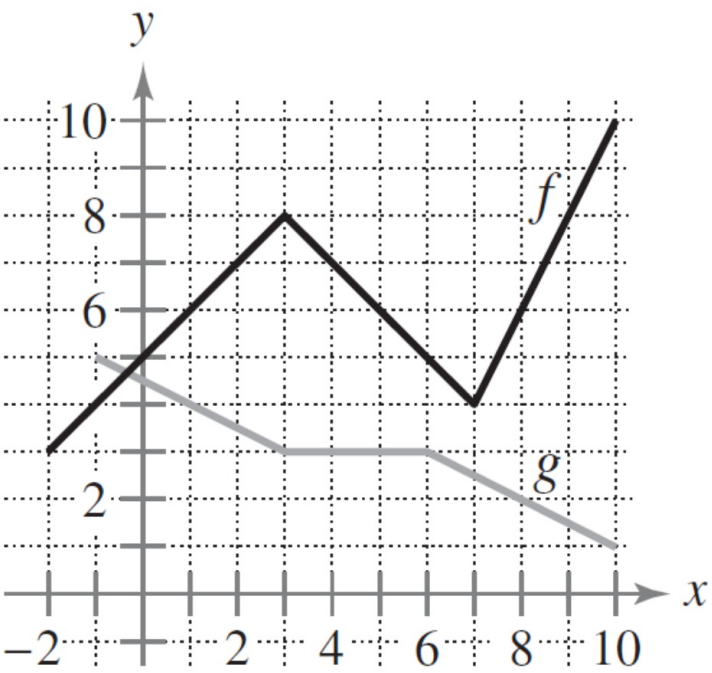
Let $p(x) = f(x)g(x)$ and $q(x) = f(x)/g(x)$

(1) (a) Find $p'(1)$.

(b) Find $q'(4)$.

(2) (a) Find $p'(4)$.

(b) Find $q'(7)$.



Derivatives with Trigonometric functions

Objective:

- Find the derivatives of trig functions

THEOREM 2.6 Derivatives of Sine and Cosine Functions

$$\frac{d}{dx}[\sin x] = \cos x \qquad \frac{d}{dx}[\cos x] = -\sin x$$

$$\frac{d}{dx}\left[5x^3 \cos x\right] =$$

$$\frac{d}{dx}\left[2x\cos x - 2\sin x\right] =$$

THEOREM 2.9 Derivatives of Trigonometric Functions

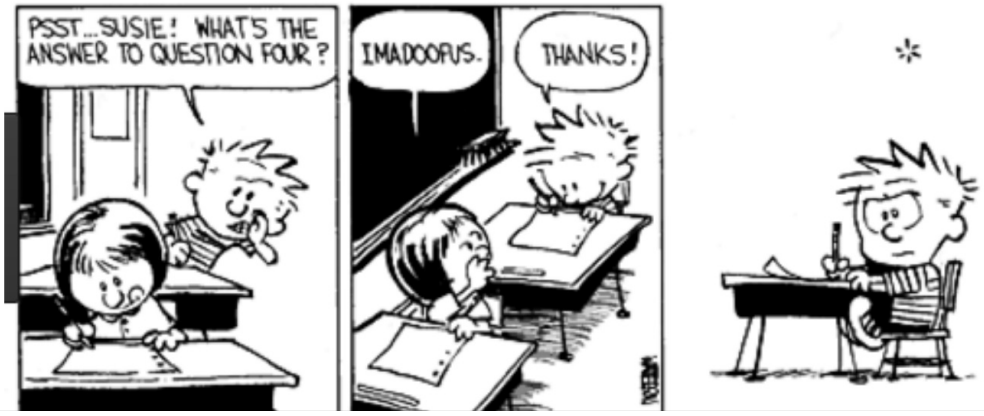
$$\frac{d}{dx}[\tan x] = \sec^2 x \qquad \frac{d}{dx}[\cot x] = -\csc^2 x$$

$$\frac{d}{dx}[\sec x] = \sec x \tan x \qquad \frac{d}{dx}[\csc x] = -\csc x \cot x$$

A way to memorize:

secx secx tanx

cscx -cscx cotx



Ex.1: $y = \frac{1}{x} + 5\sec x$, find dy/dx.

Ex.2: $f(x) = \sin x \tan x$, find $f'(x)$

Find the derivatives of the following:

Ex.3: $f(x) = \dfrac{\cot x}{1+\cot x}$

Ex.4: $y = 4 - x^2 \sin x$

Ex.5: Is there a value of *b* that will make *g(x)* continuous at *x* = 0? Differentiable at *x* = 0?

$$g(x) = \begin{cases} x + b & x < 0 \\ \cos x & x \geq 0 \end{cases}$$

Ex.6: Find all the points on the curve y = tanx where the tangent line is parallel to the line y = 2x, on the interval $(-\frac{\pi}{2}, \frac{\pi}{2})$

Recognizing the Definition of the Derivative

Ex.7: $\lim_{\Delta x \to 0} \frac{\sin\left(\frac{\pi}{3} + \Delta x\right) - \sin(\frac{\pi}{3})}{\Delta x}$

Ex.8: $\lim_{h \to 0} \frac{\csc\left(\frac{\pi}{4} + h\right) - \csc(\frac{\pi}{4})}{h}$