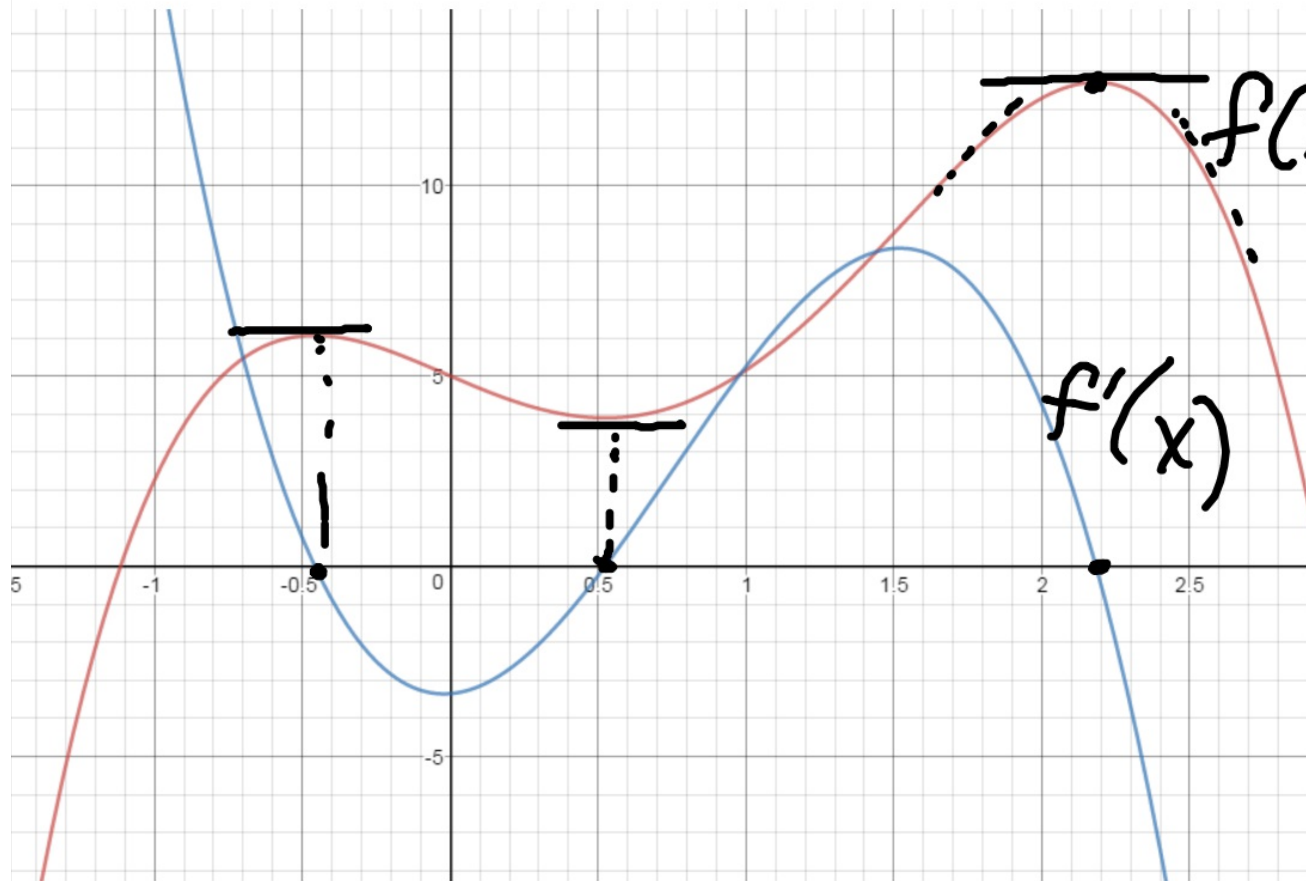


AP Calculus

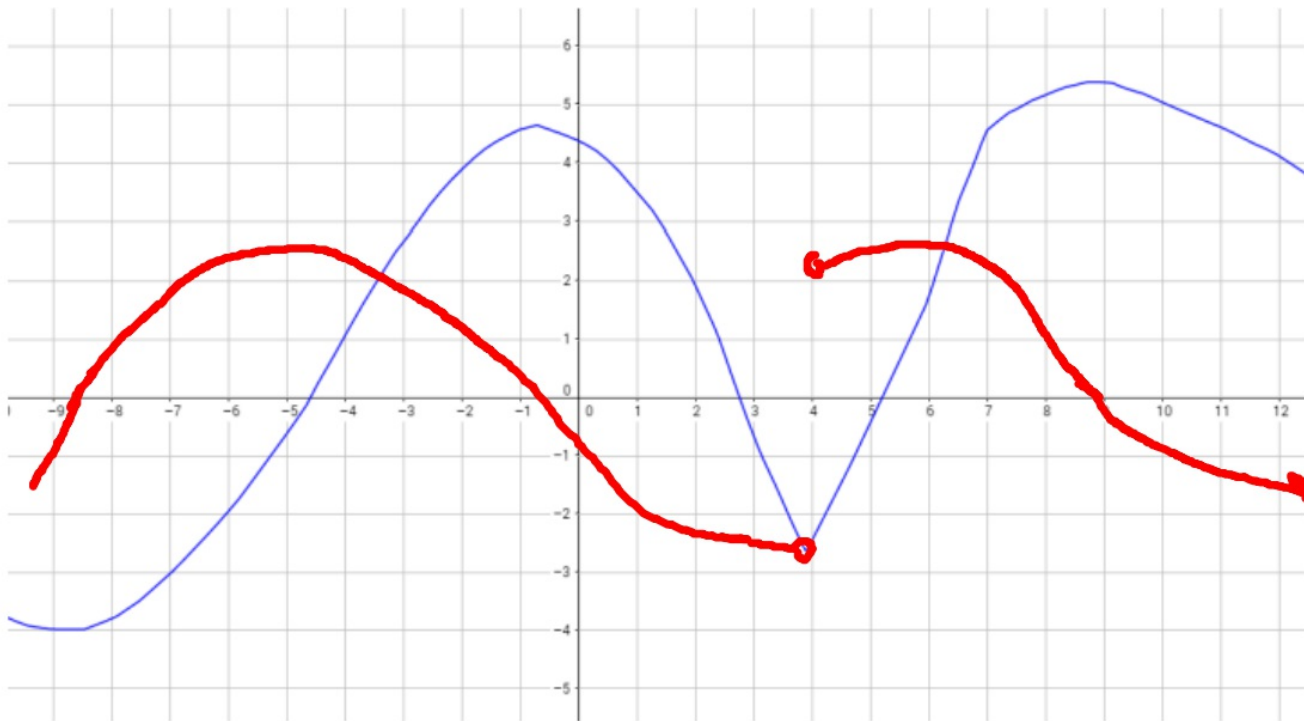
Warm up: sketch these graphs into your notes (ignore axes units)



Which graph is $f(x)$

Which graph is $f'(x)$?

Derivative as a Graph





How to use your TI-84 to find the derivative *value* (not function)

Example: find the slope of the line tangent to $y = 3x(4x-4)^{-3}$
when $x=2$

$$y = \frac{3x}{(4x-4)^3}$$

~~ex~~ $y = 2x^2 + 3x$

~~~~ $y' = 4x + 3$

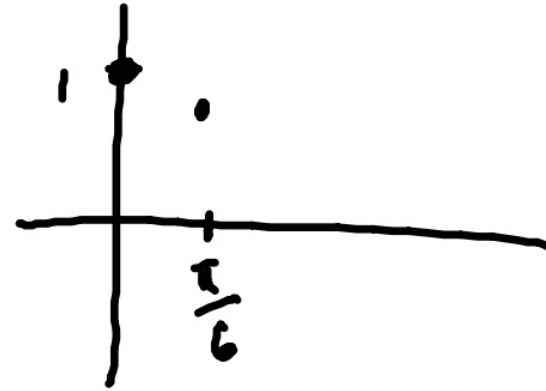
 $y'(3) = 15$

$$\left. \frac{dy}{dx} \right|_{x=4} \underline{\underline{\cos\left(\frac{3\pi}{2} + x\right)}}$$

$$\left. \frac{dy}{dx} \right|_{x=4} \approx -\underline{\underline{0.654}}$$



Finding the Derivative of Sine



Add to booklets

$$\frac{d}{dx} \sin(x) = \cos(x)$$

$$\frac{d}{dx} \cos(x) = -\sin(x)$$

(notes)

$y = 2/x - \cos(x) + 2$ Find y'

$$y = \frac{2}{x} - \cos(x) + 2$$

$$y = 2x^{-1} - \cos(x) + 2$$

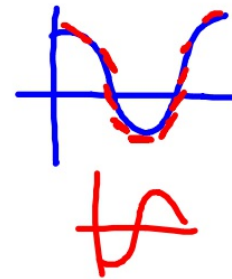
$$y' = -2x^{-2} \quad \text{---} \sin(x) + 0$$

$$-2x^{-2} + \sin(x)$$

$$-\frac{2}{x^2} + \sin(x)$$



all \in funct
have $\frac{d}{dx}$
derivatives

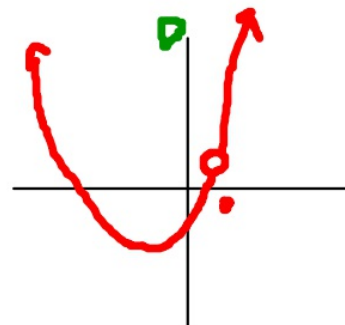
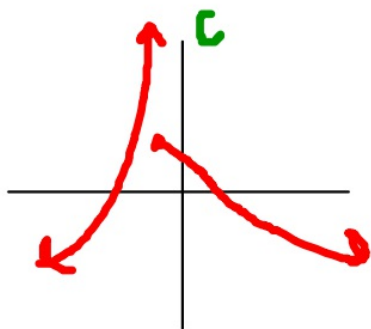
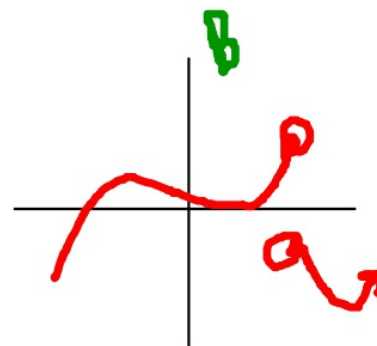
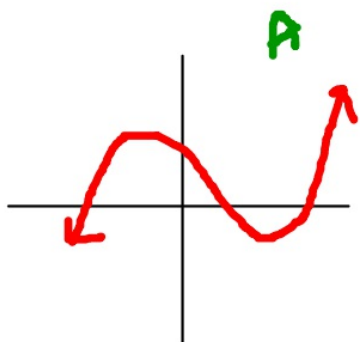


x

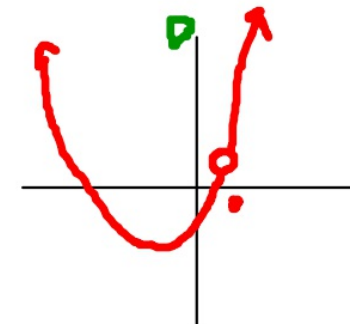
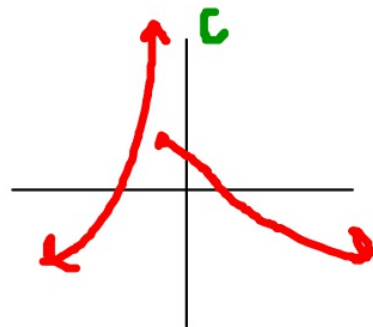
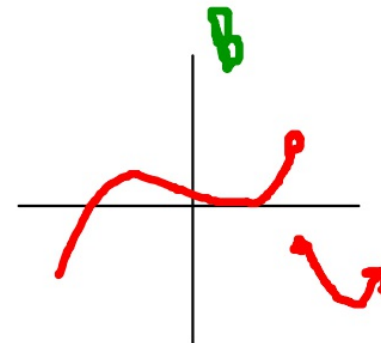
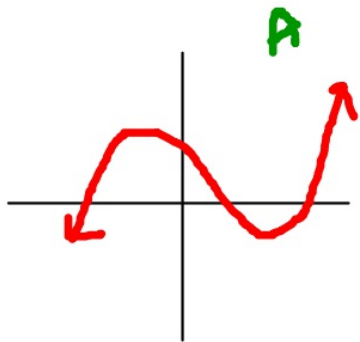
Example:

$$y = 2/x - \cos(x) + 2 \quad \text{Find } y'$$

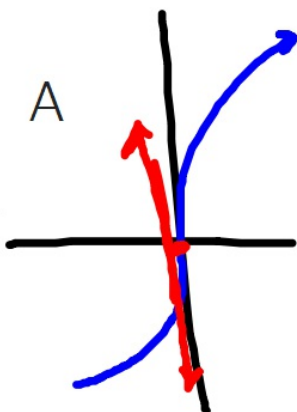
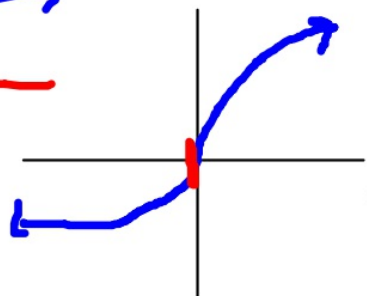
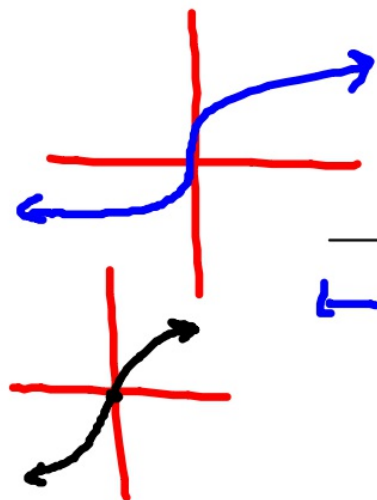
Which one doesn't belong? Be prepared to defend your selection



Go-around protocol: one person at a time shares reasoning until all 4 have spoken .

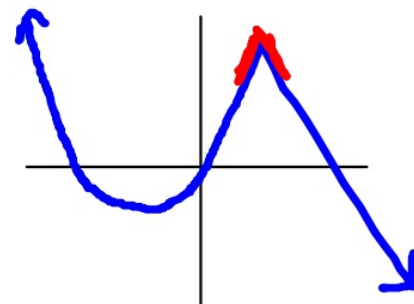


Which one doesn't belong?

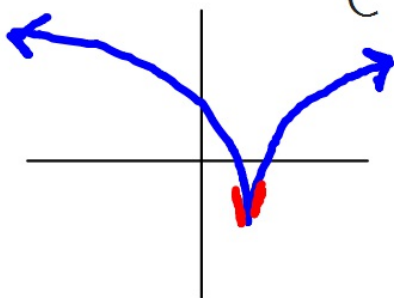


A

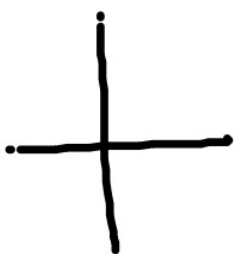
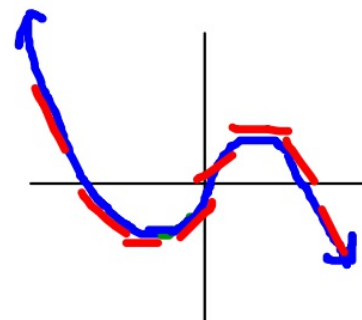
B



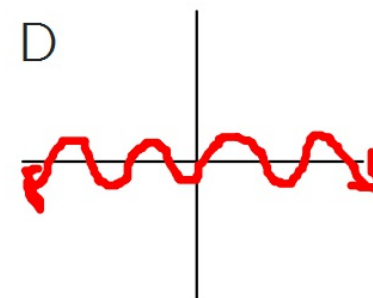
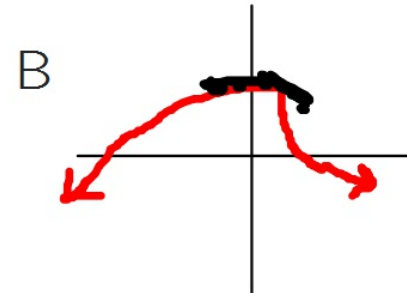
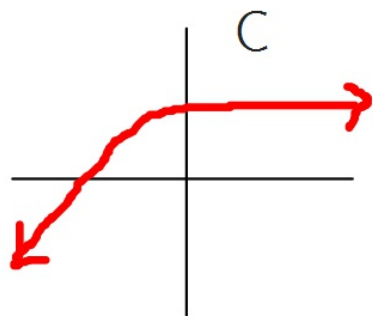
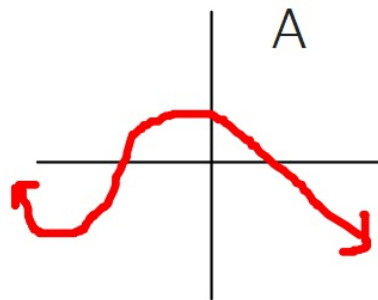
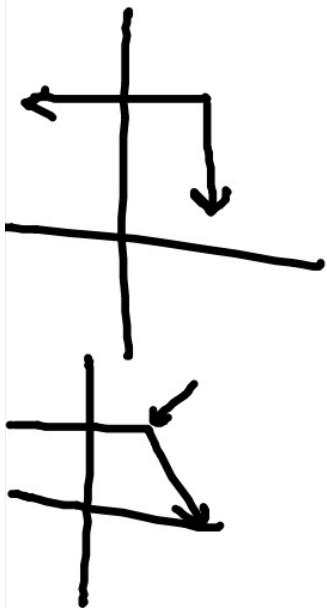
C



D



Which one doesn't belong?



Differentiability (notes)

A function f is differentiable at point c in its domain if ~~f~~

both
must
be
true

- i) f is continuous at point c
- ii) f has a unique tangent line with a defined slope at point c

$f(x)$ is considered differentiable on an interval if it is differentiable at every point on its interval.

Types of non-differentiable points

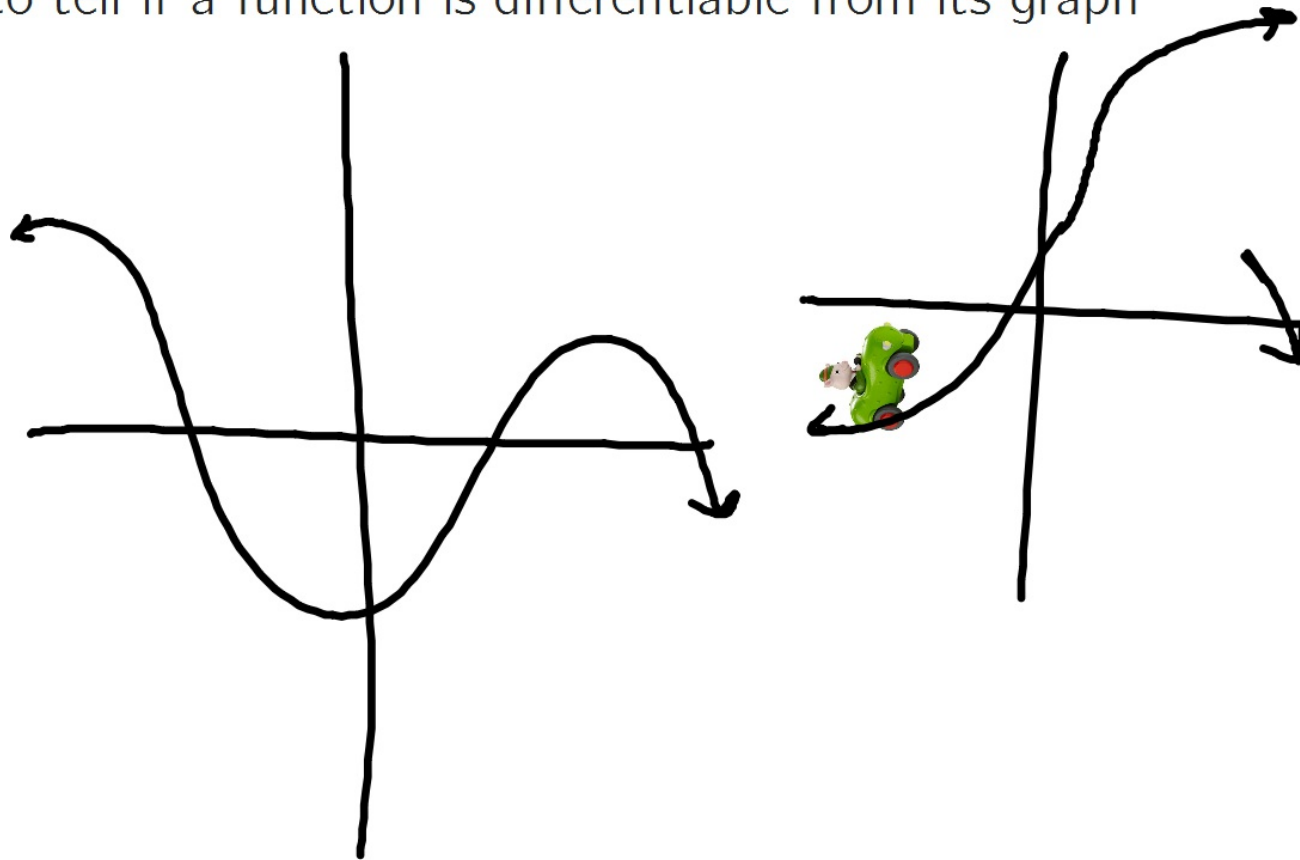
Cusp

Corner

Vertical tangents

Discontinuities

How to tell if a function is differentiable from its graph



Differentiable Function:

Verbally:

Graphically:

Algebraically:

P.114 # 54-69(x3)

#70-77

(Due Weds.)