

Solutions

Math 1300-402 - Summer 2016

Derivative Function Activity - 6/14/16

Guidelines: Please work in your project groups. As you finish problems, raise your hand and call me over to check your work. This will not be handed in and is a study resource for the next midterm.

1. Use the given graph to estimate the value of each derivative. Then sketch the graph of f' to the right.

(a) $f'(-3) = -1/3$

(b) $f'(-2) = 0$

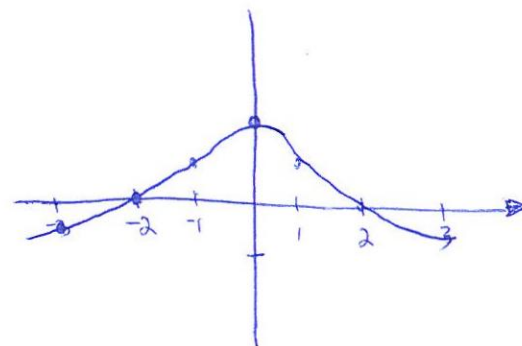
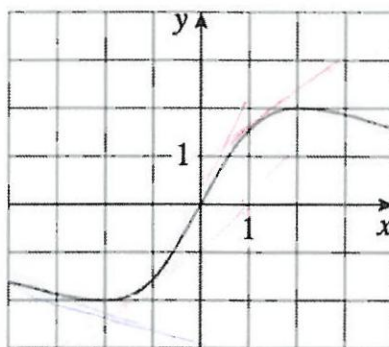
(c) $f'(-1) = 2/3$

(d) $f'(0) = 2$

(e) $f'(1) = 2/3$

(f) $f'(2) = 0$

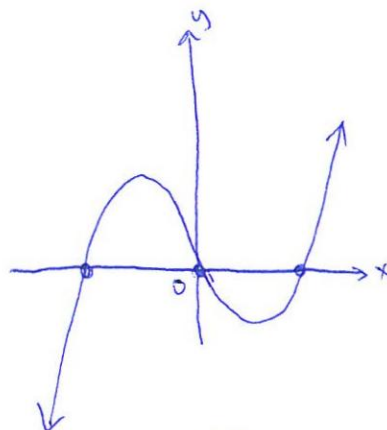
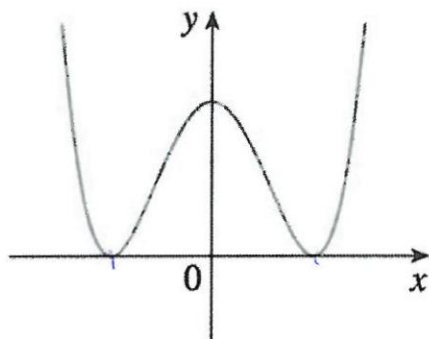
(g) $f'(3) = -1/3$



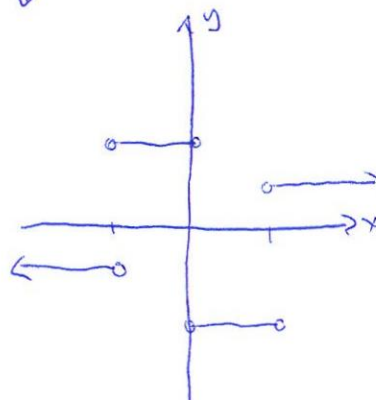
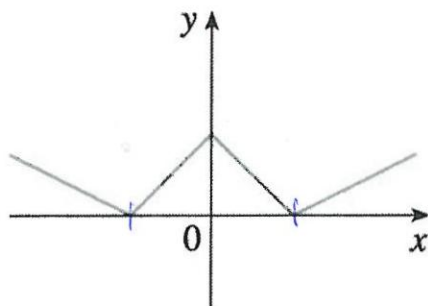
Some of your answers may vary slightly, but $f'(-2) = f'(2) = 0$ should be here.

2. Below is the graph of a differentiable function f . Redraw the axes to the right, assuming the same scale, and sketch a graph of f' .

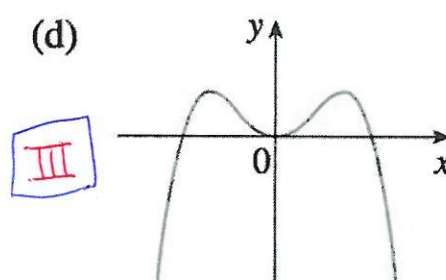
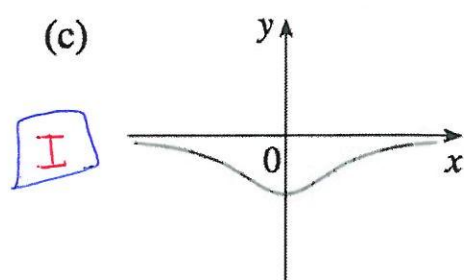
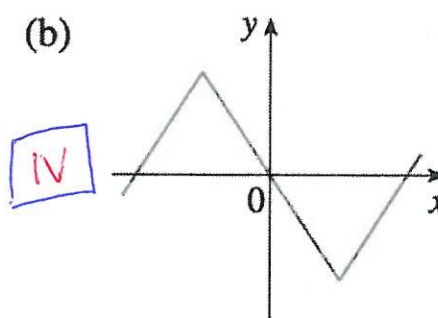
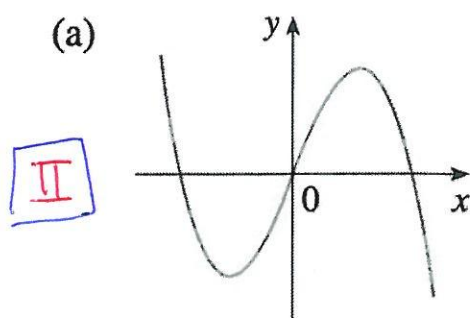
(a)



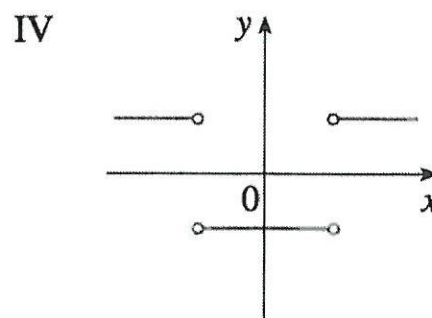
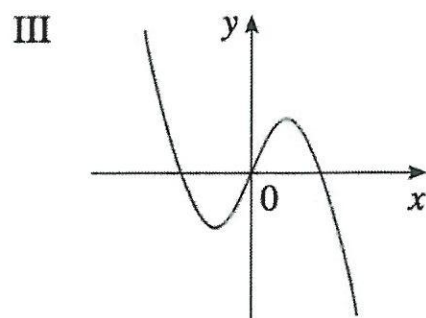
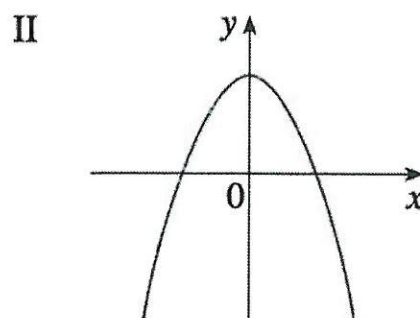
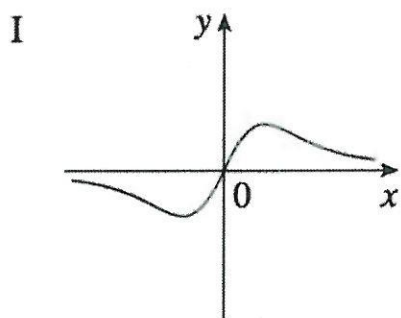
(b)



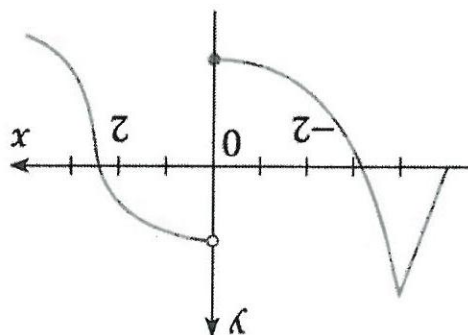
3. Match the graph of each function in (a) – (d) with the graph of its derivative in I – IV. Give reasons for your choices.



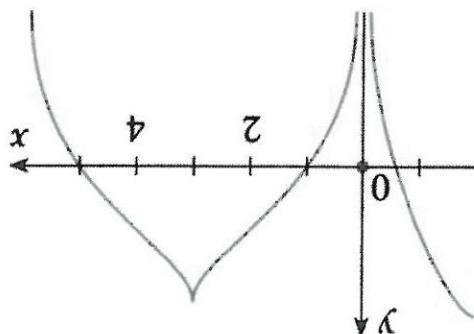
I'll leave the explanations for you to figure out.



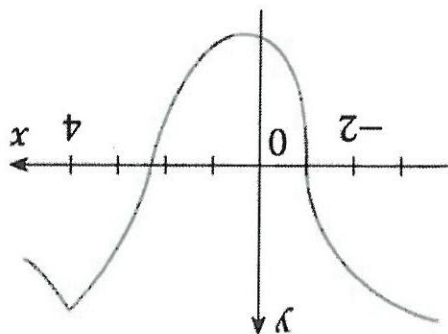
4. The graph of f is given. State, with reasons, the numbers at which f is not differentiable.



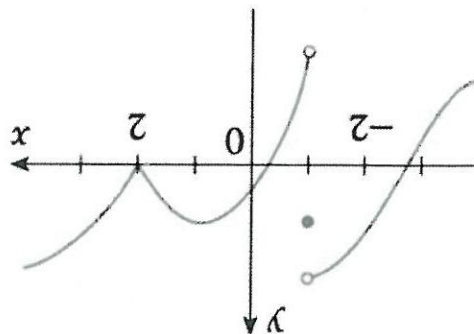
(a)



(b)



(c)



(d)

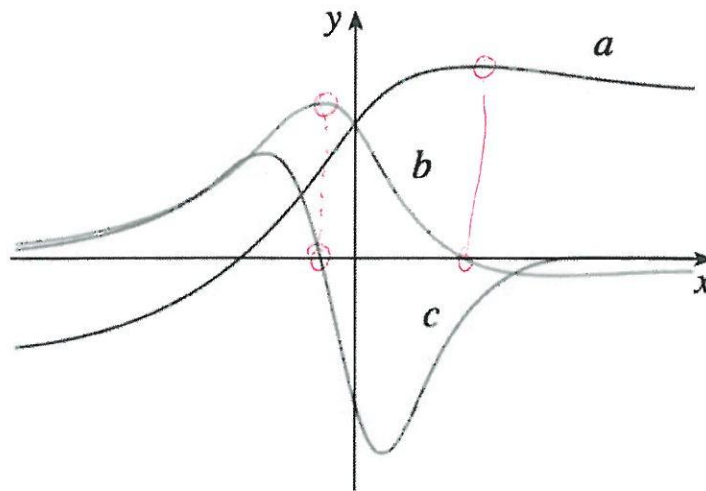
$x = -4$, cusp
 $x = 0$, jump discontinuity
 $x = \frac{2}{3}$, vertical tangent

$x = 0$, vertical asymptote (discontinuity)
 $x = 3$, cusp
 $x = 5$, vertical asymptote

$x = 1$, vertical tangent
 $x = 4$, cusp

$x = -1$, discontinuity
 $x = 2$, cusp

5. The figure shows the graphs of f , f' , and f'' . Identify each curve, and explain your choices.



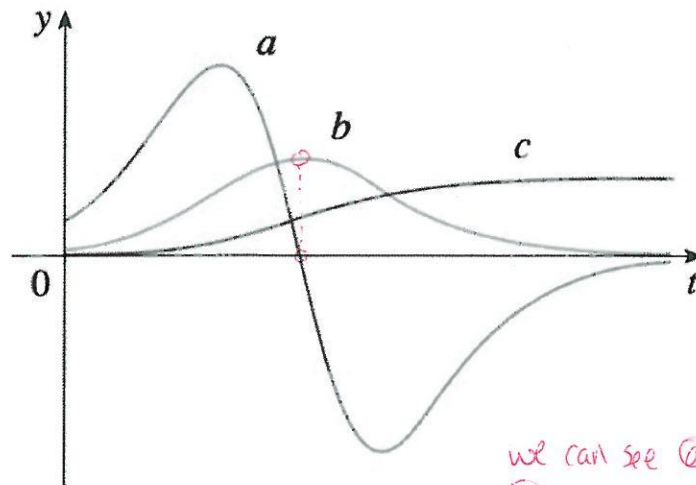
we can see (c) is the derivative of (b)
and (b) is the derivative of (a)

$$c = \frac{d}{dx} b \quad \text{and} \quad b = \frac{d}{dx} a$$

so

$$a = f, \quad b = f', \quad c = f''$$

6. The figure shows the graphs of three functions. One is the position function of a car, one is the velocity of the car, and one is its acceleration. Identify each curve, and explain your choices.



we can see (a) is the derivative of (b) $\rightarrow a = \frac{d}{dt} b$

Also, (b) is the derivative of (c) ... think about it!

$$b = \frac{d}{dt} c$$

so

$$\begin{aligned} c &= \text{position} \\ b &= \text{velocity} \\ a &= \text{acceleration} \end{aligned}$$