4-3 day 4 Connecting the Graphs of f, f', & f''

Learning Objectives:

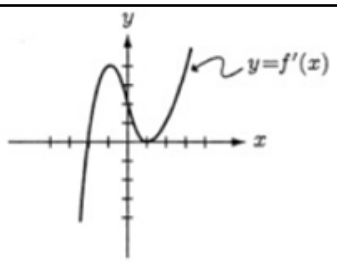
I can sketch a graph of the derivative of a function from the graph of the function.

I can sketch a graph of the function given the graph of the derivative of a function and a point on the curve.

I can identify extrema and inflection points of a function from the graph of the derivative (or second derivative) of a function.

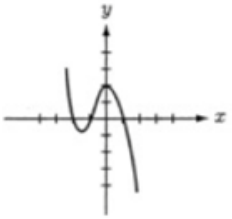
I can identify when a function is increasing, decreasing, concave up, or concave down from the graph of the derivative (or second derivative) of a function.

Oct 25-11:16 AM

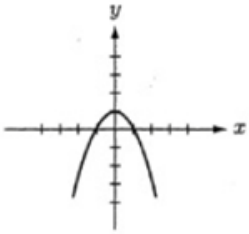


The graph of the derivative of f is shown in the figure above. Which of the following could be the graph of f?

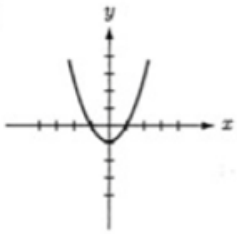
(A)



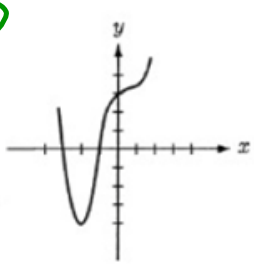
(B)



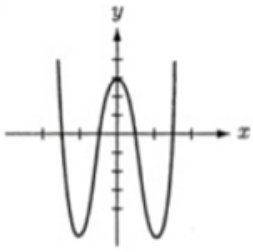
(C)



(D)



(E)



Oct 25-11:16 AM

1. (NC) If $g'(x) = \ln(x-2)$, then the graph of $y=f(x)$ is decreasing if and only if

(a) $2<x<3$ (b) $0<x$

(c) $0<x<1$ (d) $x>1$

(e) $x>2$

2. (NC) For $x \neq 0$, the slope of the tangent to $y=x\cos x$ equals 0 whenever

(a) $\tan x = -x$ (b) $\tan x = 1/x$

(c) $\tan x = x$ (d) $\sin x = x$

(e) $\cos x = x$

Nov 14-2:01 PM

3. (NC) A relative maximum of the function f(x) = $\frac{(\ln x)^2}{x}$ occurs at

(a) 0 (b) 1 (c) 2 (d) e (e) e^2

4. (NC) An equation of the line tangent to the graph of $y = x^3 + 3x^2 +$ at its point of inflection is

(a) y = -3x+1 (b) y=-3x-7 (c) y=x+5

(d) y = 3x+1 (e) y=3x+7

Let f be a function that is even and continuous on the closed interval [-3,3]. The function f and its derivative have the properties indicated in the table below.

x	0	0 < x < 1	1	1 < x < 2	2	2 < x < 3
f(x)	1	positive	0	negative	-1	negative
f′(x)	undefined	negative	0	negative	undefined	positive
f″(x)	undefined	positive	0	negative	undefined	negative

a. Find the x-coordinate of each point at which f aains an absolute maximum value or an absolute minimum value. For each x-coordinate you give, state whether f aains an absolute maximum or an absolute minimum.

b. Find the x-coordinate of each point of inflecon on the graph of f. Jusfy your answer.

c. Sketch a graph of a funcon with all of the given characteriscs of f.

Nov 15-8:27 AM

Let f be a function that is continuous on the interval [-1,4] with the properties given in the table below.

x	-1	-1 < x < 0	0	0 < x < 1	1	1 < x < 2	2	2 < x < 4	4
f(x)	1	positive	0	negative	-1	negative	0	positive	3
f'(x)	-6	negative	-1	negative	DNE	positive	~~1~~ 1	positive	8
f''(x)	3	positive	0	negative	DNE	negative	0	positive	4

a. Find all values of x at which f has extrema. Determine whether f has a relative maximum or minimum. Justify your answer.

$x = 4$, $x = -1$, max $x = 1$ f' switches from − to + so min

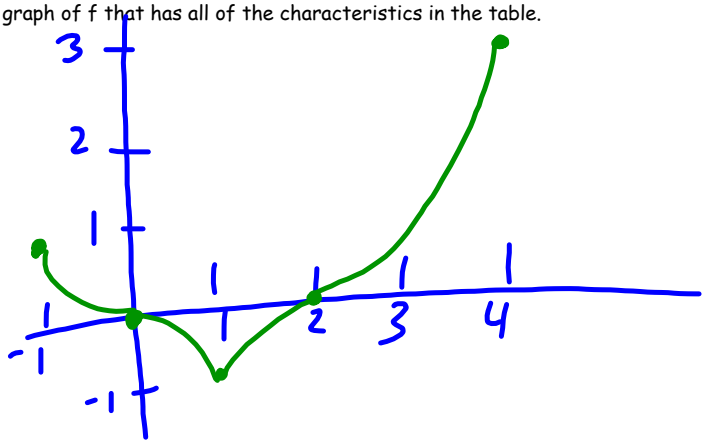
b. Find the maximum value of f.

3

c. Find any inflection points.

$x = 0$, $x = 2$

d. Sketch a graph of f that has all of the characteristics in the table.



Homework

pg 215 # 32, 41-47, 49, 50, 60

Oct 25-11:16 AM