HOMEWORK

Day 2 Assignment: Complete both sides of this page.

1. $f(x)=\frac{1}{3}x^3-x^2-3x+5$ *Show all work for the following. NO CALCULATOR UNTIL PART e!*

a. Find f'. Determine the intervals on which f is increasing & decreasing. *Hint: NLA!*

$f'(x)=x^2-2x-3$
$=(x-3)(x+1)$

$x-3$	$-$	$-$	$+$
$x+1$	$-$	$+$	$+$
	-1		3

b. Use your *NLA* to determine the coordinates of the relative maximum and relative minimum.

max: $(-1, 6\frac{2}{3})$ min: $(3, -4)$

c. Find f''. Determine the intervals on which f is concave up & concave down. *Hint: NLA!*

$f''(x)=2x-2$
$=2(x-1)$

$x-1$	$-$	$+$

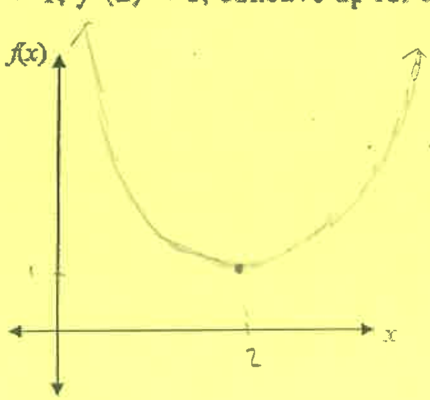
d. Use your *NLA* to determine the coordinates of the point(s) of inflection.

POI: $(1, \frac{4}{3})$

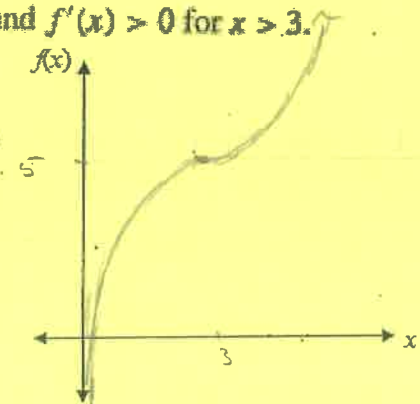
e. Check your answers to parts a – d using your calculator. (You do not have to sketch the graph.)

Sketch & label the graph of the function that has the properties described.

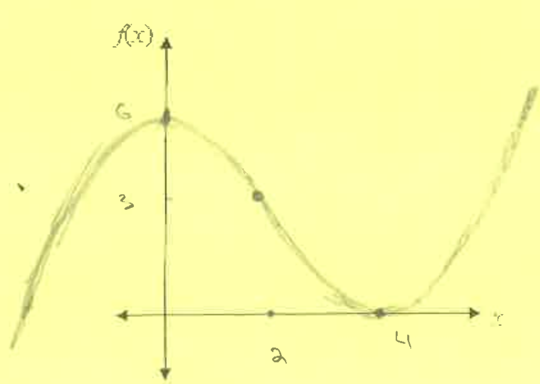
7. $f(2)=1$; $f'(2)=0$; concave up for all x.



9. $f(3)=5$; $f'(x)>0$ for $x<3$; $f'(3)=0$; and $f'(x)>0$ for $x>3$.



11. (0, 6), (2, 3), and (4, 0) are on the graph: $f'(0)=0$ and $f'(4)=0$; $f''(x)<0$ for $x<2$; $f''(2)=0$, $f''(x)>0$ for $x>2$.



OVER →

19. Refer to the graph in Figure 13. Fill in each entry of the grid with POS, NEG, or 0.

	f	f'	f''
A	+	+	−
B	0	−	0
C	−	0	+

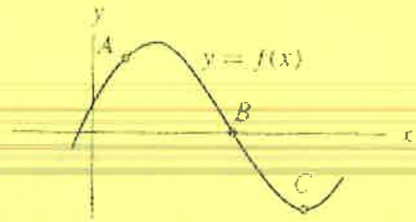


FIGURE 13

Exercises 35 – 43 refer to Figure 15, which contains the graph of $f'(x)$, the derivative of the function $f(x)$.

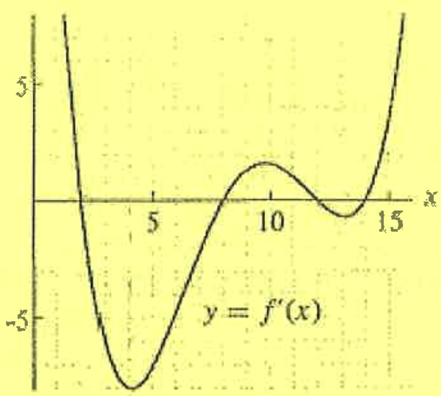


FIGURE 15 Graph of $f'(x)$

35. How many relative extreme points does $f(x)$ have? 4 zeros of $f'(x)$
36. How many relative minimum points does $f(x)$ have? 2 f' changes from neg to pos
37. How many inflection points does $f(x)$ have? 3 max/mins of $f'(x)$
38. How many relative maximum points does $f(x)$ have? 2 f' changes from pos to neg
39. Is $f''(8)$ positive or negative? Positive f' increasing
40. Is $f''(12)$ positive or negative? Negative f' decreasing
41. Explain why the tangent line to $f(x)$ at $x = 2$ lies above the graph of $f(x)$.

X= 2 is a Maximum on f(x)

42. Explain why the tangent line to $f(x)$ at $x = 14$ lies below the graph of $f(x)$.

X = 14 is a minimum of f(x)

43. Suppose $f(4) = 1$. What is the equation of the tangent line to the graph of $f(x)$ at the point (4, 1)?

$f'(4) = -8$ $\quad$ $y - 1 = -8(x-4)$