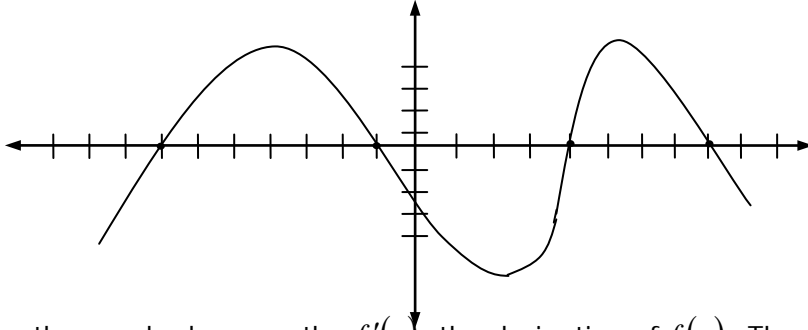


Curve Sketching Review 1

1) Consider the curve defined by the equation  $y^3 + 3x^2y + 13 = 0$ .

- Find  $\frac{dy}{dx}$ .
- Write an equation for the line tangent to the curve at  $(2, -1)$ .
- Find the minimum  $y$ -coordinate of any point on the curve. Justify your answer.



- 2) Consider the graph above as the  $f'(x)$ , the derivative of  $f(x)$ . The domain of the function  $f(x)$  is the set of all  $x$  such that  $-10 \leq x \leq 10$ . The graph of  $f'(x)$  has a zero slope when  $x = -4, 2, 5$ .
- For what values of  $x$  does the graph of  $f$  have a horizontal tangent?
  - For what values of  $x$  in the interval  $(-10, 10)$  does  $f$  have a relative maximum. Justify.
  - For what values of  $x$  is the graph concave downward? Justify your answer.

3) Consider the curve given by  $y^2 = 2 + xy$ .

- Show that  $\frac{dy}{dx} = \frac{y}{2y-x}$
- Find all the points  $(x, y)$  on the curve where the line tangent has slope  $\frac{1}{2}$
- Show that there are no points  $(x, y)$  on the curve where the line tangent is horizontal.
- Let  $x$  and  $y$  be functions of time that are related by the equation  $y^2 = 2 + xy$ .  
At time  $t = 5$ , the value of  $y$  is 3 and  $\frac{dy}{dt} = 6$ . Find the value of  $\frac{dx}{dt}$  at time  $t = 5$ .

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

$x$	0	$0 < x < 1$	1	$1 < x < 2$	2	$2 < x < 3$
$f(x)$	1	POS	0	NEG	-1	NEG
$f'(x)$	undefined	NEG	0	NEG	undefined	POS
$f''(x)$	undefined	POS	0	NEG	undefined	NEG

- Find the  $x$ -coordinate of each point at which  $f$  attains an absolute maximum value or an absolute minimum value. Justify your answers.
- Find the  $x$ -coordinate of each point of inflection on the graph of  $f$ . Justify your answers.
- Sketch the graph of a function with the given characteristics of  $f$ .