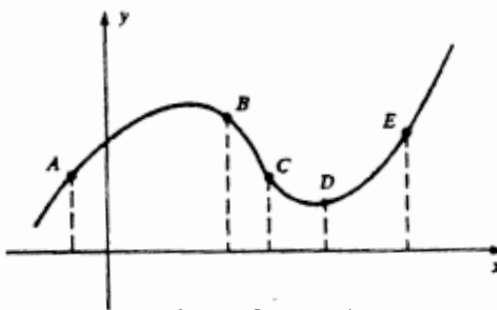


MCS22 – Calculus
Exam 1 Review Sheet

1. What are all values of x for which the graph of $y = 6x^2 + \frac{x}{2} + 3 + \frac{6}{x}$ is concave downward?

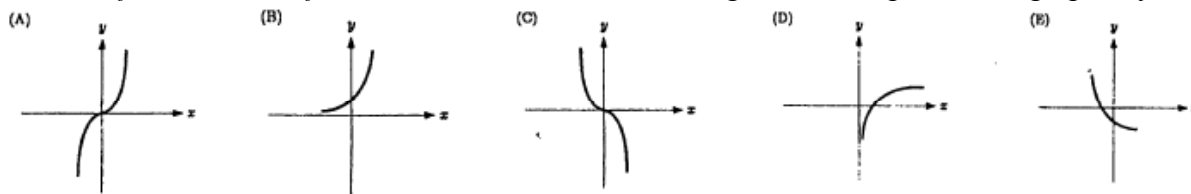
2. If the graph at right represents $y = f(x)$, at which point(s) on the graph do $f'(x)$ and $f''(x)$ have the same sign?



3. How many points of inflection does the graph of $f(x) = 2x^6 + 9x^5 + 10x^4 - x + 2$ have?

4. On what interval(s) is the function $f(x) = \frac{x^2 + 1}{x^2}$ concave upward?

5. If, for all x , $f'(x) > 0$ and $f''(x) < 0$, which of the following could be a part of the graph of f ?

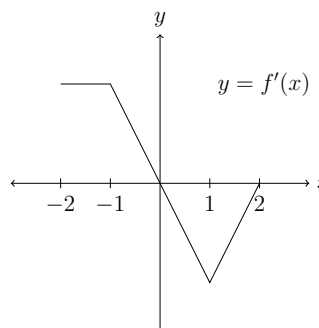


6. The function $y = x^4 + bx^2 + 8x + 1$ has a horizontal tangent and a point of inflection at the same value of x . What is the value of b ?

7. Sketch the graph of $y = \frac{1}{3}x^3 - 2x^2$. Plot the stationary points and the inflection points.

8. The graph of f' , the derivative of the function f , is shown below. Which of the following statements is true about f ?

- (A) f is decreasing on $[-1, 1]$
- (B) f is increasing on $[-2, 0)$
- (C) f is increasing on $[1, 2]$
- (D) f has a local minimum at $x = 0$
- (E) f is not differentiable at $x = -1$ or $x = 1$

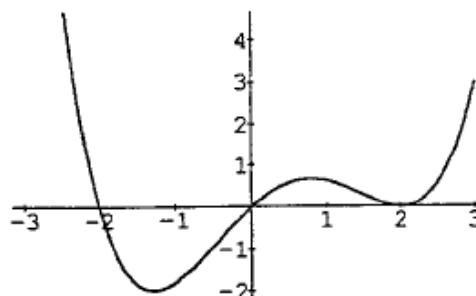


9. Sketch a graph of a function whose *derivative* satisfies the properties given in the table below.

x	$(-\infty, -1)$	-1	$(-1, 1)$	1	$(1, 3)$	3	$(3, \infty)$
$f'(x)$	positive	0	negative	0	positive	0	negative

10. The graph at the right is the *derivative* of a function f .

- (a) Find where f is increasing or decreasing. Justify your answer.
- (b) Find where all relative extrema occur. Justify your answer.
- (c) If $f(-3) = 2$, sketch a possible graph of f .



11. Let f be a function defined on the closed interval $-3 \leq x \leq 4$ with $f(0) = 3$. The graph of f' , the derivative of f , consists of one line segment and a semicircle, as shown below.

- (a) On what intervals, if any, is f increasing? Justify your answer.
- (b) Find the x -coordinate of each point of inflection of the graph of f on the open interval $-3 < x < 4$. Justify your answer.
- (c) Find an equation for the line tangent to the graph of f at the point $(0, 3)$

