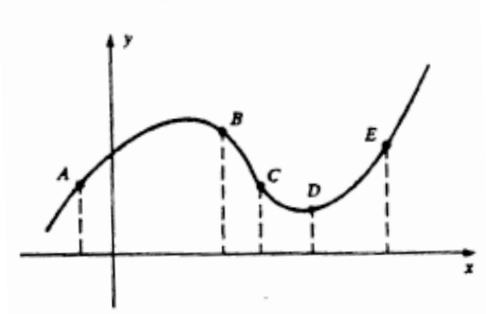
MCS22 – Calculus
Exam 1 Review Sheet

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?

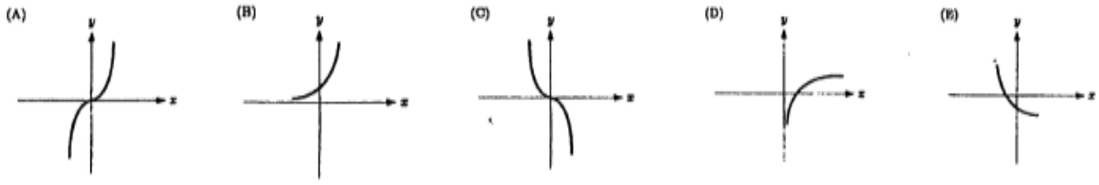
2. If the graph at right represents $y = f(x)$, at which point(s) on the graph do $f'(x)$ and $f''(x)$ have the same sign?



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. (a) State the interval(s) on which the graph of $y = 2x^3 - 6x^2 + 7$ is decreasing.

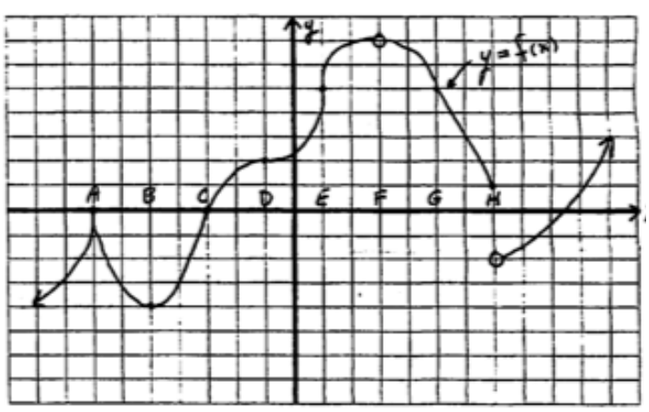
   (b) Find the absolute maximum and absolute minimum of $y = 2x^3 - 6x^2 + 7$ on the interval [-1, 3].

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. For each x-value, determine if the derivative at that value is positive (+), negative (–), zero (0), or does not exist (DNE), and place a check mark (✓) in the appropriate box.

	+	–	0	DNE
A				
B				
C				
D				
E				
F				
G				
H				



11. For what value(s) of x does the function $f(x) = x^4 + 4x^3$ have a relative minimum?