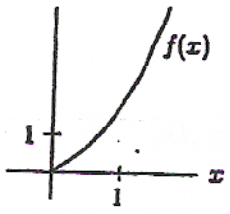
CALCULUS

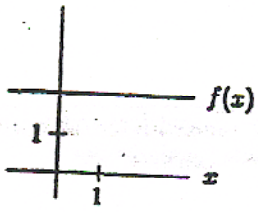
WORKSHEET ON f, f', f'' #2

For problems 1 – 6, give the signs of the first and second derivatives for each of the following functions.

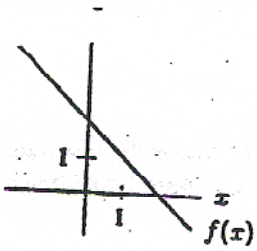
1.



2.



3.



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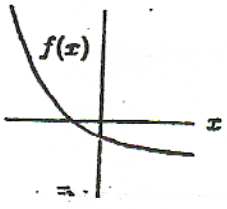
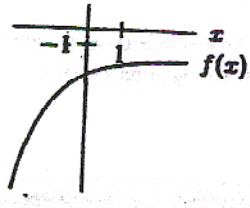
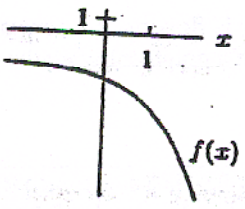


5.



6.



7. Let $P(t)$ represent the price of a share of stock of a corporation at time t. What does each of the following statements tell us about the signs of the first and second derivatives of $P(t)$?

(a) "The price of the stock is rising faster and faster."

(b) "The price of the stock is close to bottoming out."

8. Given the following data:

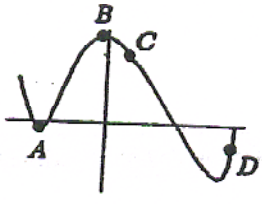
x	0	0.2	0.4	0.6	0.8	1.0
$f(x)$	3.7	3.5	3.5	3.9	4.0	3.9

(a) Estimate $f'(0.6)$ and $f'(0.5)$.

(b) Estimate $f''(0.6)$.

(c) Where do you think the maximum and minimum values of f occur in the interval $0 \le x \le 1$?

9. The graph of a function $f(x)$ is shown in the figure below. On the table, indicate whether f, f', f'' at each of the marked points is positive, negative, or zero.



Point	f	f'	f''
A			
B			
C			
D			

TURN->>>

10. Do the values for the function $y = k(x)$ in the table below suggest that the graph of $k(x)$ is concave up or concave down for $1 \le x \le 3.3$? Write a sentence in support of your conclusion.

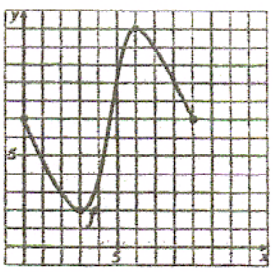
x	1.0	1.2	1.5	1.9	2.5	3.3
$k(x)$	4.0	3.8	3.6	3.4	3.2	3.0

11. (a) Water is flowing at a constant rate into a cylindrical container standing vertically. Sketch a graph showing the depth of water against time.

(b) Water is flowing at a constant rate into a cone-shaped container standing in its vertex. Sketch a graph showing the depth of the water against time.

12. If water is flowing at a constant rate into the Grecian urn in the figure on the right, sketch a graph of the depth of the water against time. Mark on the graph the time at which the water reaches the widest point of the urn.

13. Let f be defined as shown in the figure on the right. Use the graph of f to estimate the values of c that satisfy the conclusion of Rolle's Theorem on [0, 9]. What theorem would apply for the interval [0, 5]?



14. At what value of x does the graph of $y = \frac{1}{x^2} - \frac{1}{x^3}$ have a point of inflection?

(A) 0 (B) 1 (C) 2 (D) 3 (E) At no value of x

15. The absolute maximum value of $f(x) = x^3 - 3x^2 + 12$ on the closed interval $[-2, 4]$ occurs at $x =$

(A) 4 (B) 2 (C) 1 (D) 0 (E) -2

16. Let f be a polynomial function with degree greater than 2. If $a \neq b$ and $f(a) = f(b) = 1$, which of the following must be true for a least one value of x between a and b?

I. $f(x) = 0$

II. $f'(x) = 0$

III. $f''(x) = 0$

(A) None (B) I only (C) II only (D) I and II only (E) I, II, and III