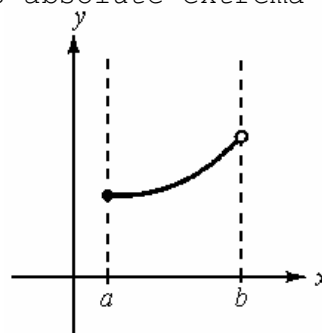


AP Calculus Review
Chapter 3

1. Determine from the graph whether f possesses absolute extrema on the interval $[a, b]$.

- A. None of these
 B. Maximum at $x = b$; minimum at $x = a$
 C. Maximum at $x = a$; minimum at $x = b$
 D. No extrema
 E. No maximum; minimum at $x = a$



2. Decide whether Rolle's Theorem can be applied to $f(x) = x^2 + 3x$ on the interval $[0, 2]$. If the Rolle's Theorem can be applied, find all value(s) of c in the interval such that $f'(c) = 0$. If the Mean Value Theorem cannot be applied, state why.

- A. None of these
 B. Rolle's Theorem can be applied; $c = 0, -3$.
 C. Rolle's Theorem does not apply because $f(0) \neq f(2)$.
 D. Rolle's Theorem can be applied; $c = -\frac{3}{2}$
 E. Rolle's Theorem does not apply because $f(x)$ is not continuous on $[0, 2]$.

3. Which of the following statements is true of $f(x) = -x^3 - 6x^2 - 9x - 2$?

- A. f is decreasing on $(-3, -1)$.
 B. f is increasing on $(-\infty, -3)$.
 C. f is increasing on $(-2, \infty)$.
 D. None of these
 E. f is increasing on $(-3, -1)$.

4. Find the values of x that give relative extrema for the function

$$f(x) = (x + 1)^2(x - 2).$$

- A. Relative maxima: $x = 1, x = 3$; Relative minimum: $x = -1$
 B. Relative maximum: $x = -1$; Relative minimum: $x = 2$
 C. Relative minimum: $x = 2$
 D. None of these
 E. Relative maximum: $x = -1$; Relative minimum: $x = 1$

5. Given that $f(x) = -x^2 + 18x - 78$ has a relative maximum at $x = 9$, choose the correct statement.

- A. f' is positive on the interval $(-\infty, \infty)$.
 B. f' is positive on the interval $(9, \infty)$.
 C. f' is negative on the interval $(9, \infty)$.
 D. None of these
 E. f' is negative on the interval $(-\infty, 9)$.

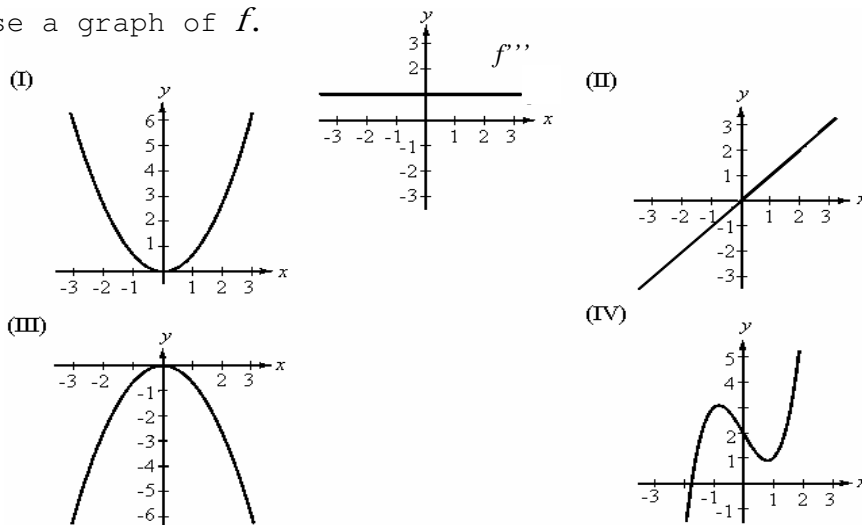
6. Find all intervals on which the graph of the function is concave upward:

$$f(x) = \frac{x^2 + 1}{x^2}$$

- A. $(1, \infty)$
 B. None of these
 C. $(-\infty, -1)$ and $(1, \infty)$
 D. $(-\infty, \infty)$
 E. $(-\infty, 0)$ and $(0, \infty)$

7. The figure given in the graph is the **third** derivative of a polynomial function, f . Choose a graph of f .

- A. graph II
 B. graph III
 C. graph I
 D. graph IV
 E. None of these.



8. Let $f(x)$ be a polynomial function such that $f(4) = -1$, $f'(4) = 0$, $f''(4) = 0$. If $x < 4$, then $f''(x) > 0$ and if $x > 4$, then $f''(x) < 0$.

The point $(4, -1)$ is a _____ of the graph of f .

- A. Relative maximum
 B. Critical number
 C. Point of inflection
 D. None of these
 E. Relative minimum

9. Find $\lim_{x \rightarrow \infty} \frac{2x^3 + 6x^2 + 5}{3x + 2x^3}$

- A. ∞
 B. 2
 C. None of these
 D. $\frac{2}{3}$
 E. 1

10. Find the limit: $\lim_{x \rightarrow \infty} \frac{\sin x}{3x}$

- A. ∞
 B. 0
 C. None of these
 D. $\frac{1}{3}$
 E. 3

11. Find the horizontal asymptotes (if any) for $f(x) = \frac{ax^3}{b+cx+dx^2}$
- A. $y = 0$
 - B. $y = \frac{a}{b}$
 - C. There are no horizontal asymptotes.
 - D. None of these
 - E. $y = \frac{a}{d}$

12. A farmer has 160 feet of fencing to enclose 2 adjacent rectangular pigpens. What dimensions should be used for each pigpen so that the enclosed area will be a maximum?

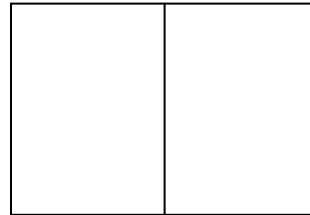
A. None of these

B. $20\text{ ft} \times \frac{80}{3}\text{ ft}$

C. $40\text{ ft} \times \frac{80}{3}\text{ ft}$

D. $40\text{ ft} \times 40\text{ ft}$

E. $4\sqrt{15}\text{ ft} \times \frac{8}{5}\sqrt{15}\text{ ft}$



13. A nursery has determined that the demand in June for potted plants is $p = 2.00 - (x/30,000)$. The cost of growing x plants is $C = 2000 + 0.20x$, $0 \leq x \leq 100,000$. Find the marginal profit function.

A. $1.8x - \frac{x^2}{30,000} - 2000$

B. None of these

C. $1.8 - \frac{x}{15,000}$

D. $-\frac{6001}{30,000}$

E. $\frac{53,900}{30,000}$

14. Let $f''(x) = 4x^3 - 2x$ and let $f(x)$ have critical numbers -1 , 0 , and 1 . Use the Second Derivative Test to determine which critical numbers, if any, give a relative maximum.

A. None of these

B. -1 and 1

C. -1

D. 0

E. 1

15. Find all points of inflection: $f(x) = x^3 - 12x$.

A. $(2, 0)$, $(-2, 0)$

B. $(0, 0)$, $(\pm\sqrt{12}, 0)$

C. $(2, -16)$, $(-2, 16)$

D. $(0, 0)$

E. None of These

1. e
2. c
3. e
4. e
5. c
6. e
7. d
8. c
9. e
10. b
11. c
12. b
13. c
14. c
15. d