



EXAM 2 REVIEW

Problem 1. Find $f''(x)$ for the following.

a. $f(x) = x^4 - 18x^2 + 13x$

b. $f(x) = \ln(49 - x^2)$

c. $f(x) = e^{x^3 - 12x}$

Problem 2. The function $f(x)$ has domain $(-\infty, \infty)$. $f'(x) = (x - 1)^2(x + 5)(x - 3)^3$ and $f''(x) = 6(x - 3)^2(x - 1)(x^2 + 2x - 7)$.

a. Find the partition numbers of $f'(x)$.

b. Find the partition numbers of $f''(x)$.

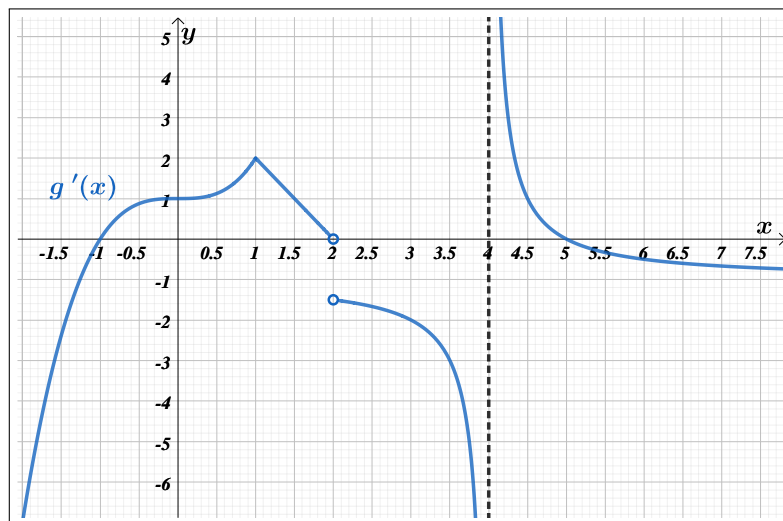
c. Find the intervals where f is increasing.

d. Find the intervals where f is concave down.

e. Find the x -value(s) of any inflection points of f .



Problem 3. The function $g'(x)$ is graphed below (i.e., the graph of the *derivative* of $g(x)$). $g(x)$ has domain $(-\infty, 4) \cup (4, \infty)$.



- a. Find the partition numbers of g'' .

- b. Find the intervals where g is concave up.

- c. Determine the intervals where g is increasing.



Problem 4. Let $f(x) = 7x^6 - 2x^5$.

- Find the critical values of f .
- Find the intervals where f is increasing.
- Find the intervals where f is decreasing.
- Find the x -value(s) of any local extrema and specify the type.
- Find the partition numbers of f'' .
- Find the intervals where f is concave up.
- Find the intervals where f is concave down.
- Find the x -value(s) of any inflection points of f .



Problem 5. The function $f(x)$ has a continuous second derivative.

- a. If $f(9) = -1$, $f'(9) = 0$, and $f''(9) = 10$, what can be concluded about the point $(9, -1)$?
- A. f has a local maximum at $(9, -1)$.
 - B. f has a local minimum at $(9, -1)$.
 - C. f does not have a local extrema at $(9, -1)$.
 - D. It cannot be determine if f has a local extrema at $(9, -1)$ or not.
 - E. None of the above.
- b. If $f(-3) = 8$, $f'(-3) = 1$, and $f''(-3) = -30$, what can be concluded about the point $(-3, 8)$?
- A. f has a local maximum at $(-3, 8)$.
 - B. f has a local minimum at $(-3, 8)$.
 - C. f does not have a local extrema at $(-3, 8)$.
 - D. It cannot be determine if f has a local extrema at $(-3, 8)$ or not.
 - E. None of the above.



Problem 6. Find $\frac{dy}{dx}$ if $8x^2 + 3x^3e^y - 3y^2 = 18$

Problem 7. The area of a rectangle is growing at a rate of 156 square inches per second and the width is growing at a rate of 8 inches per second. Find the rate of change of the length when the length is 9 inches and the width is 7 inches.

Problem 8. Pack Men is a moving company specializing in safely transporting arcade game cabinets. The yearly profit function is $P(x) = 220\sqrt{x^{7/3} + 90} - 340x - 2000$ dollars when x moves are completed.

a. Find the marginal profit function for Pack Men.

b. Find the approximate profit for Pack Men for the 3300th move.