



SECTIONS 2.6 AND 3.1

Problem 1. A large circular puddle is growing in a rainstorm, increasing the surface of the lake at a rate of 2 square feet per hour when the radius is 6 feet. At what rate is the radius increasing at this time? Round your answer to 2 decimal places if necessary.

Problem 2. The top of a 19 foot ladder, leaning against a vertical wall, is slipping down the wall at a rate of 5 feet per second. How fast is the bottom of the ladder sliding along the ground when the bottom of the ladder is 9 feet away from the base of the wall? Round your answer to 2 decimal places if necessary.



Problem 3. Suppose that for a company manufacturing an artisanal abacus, the cost and revenue equations (in dollars) are given by $C = 70000 + 50x$ and $R = 400x - \frac{1}{4000}x^2$ where the production output in one week is x abaci. If the production rate is increasing at a rate of 700 abaci per week when the production output is 4000 abaci, find the following.

a. The rate of change of the cost with respect to time.

b. The rate of change of the revenue with respect to time.

c. The rate of change of the profit with respect to time.

Problem 4. Let $f(x) = x^3 - 6x^2 - 15x + 4$.

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

b. Find all critical values of $f(x)$.

c. Find the interval(s) where $f(x)$ is increasing.

d. Find the interval(s) where $f(x)$ is decreasing.

e. Find the x -value(s) and y -value(s) of all local maxima of $f(x)$.

f. Find the x -value(s) and y -value(s) of all local minima of $f(x)$.

Problem 5. Let $f(x) = \frac{7x^2}{x-5}$.

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

b. Find all critical values of $f(x)$.

c. Find the interval(s) where $f(x)$ is increasing.

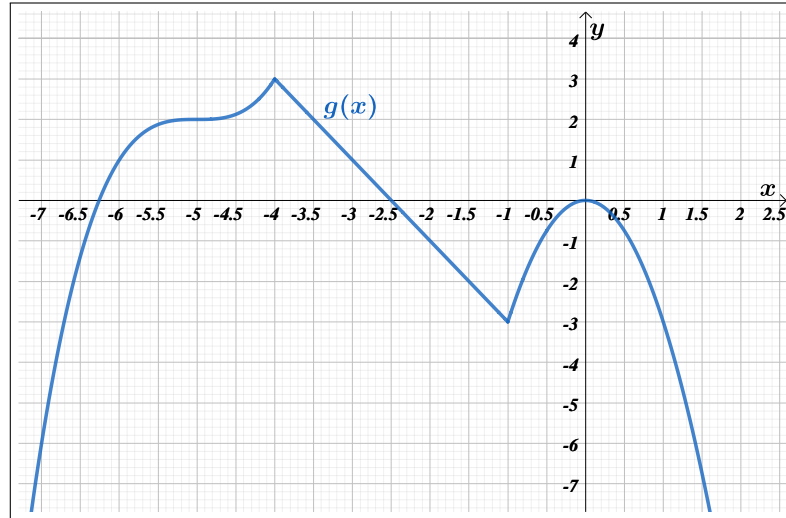
d. Find the interval(s) where $f(x)$ is decreasing.

e. Find the x -value(s) and y -value(s) of all local maxima of $f(x)$.

f. Find the x -value(s) and y -value(s) of all local minima of $f(x)$.



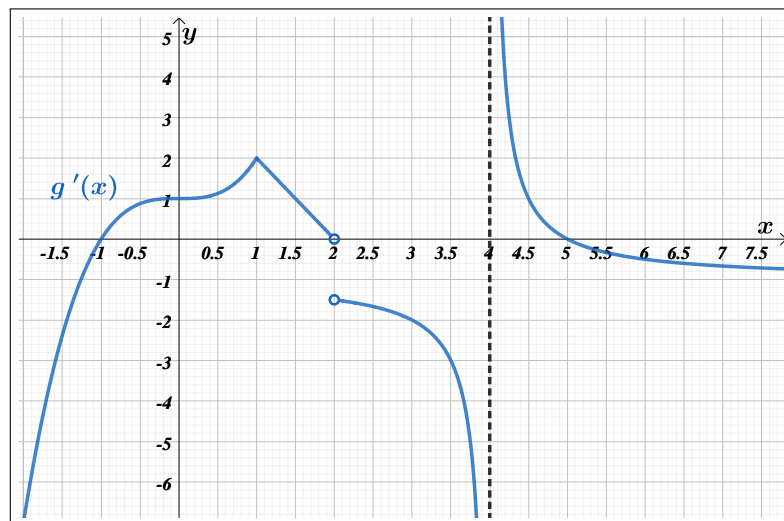
Problem 6. The function $g(x)$ is graphed below. It has domain $(-\infty, \infty)$.



- Find the partition numbers of $g'(x)$.
- Find the critical values of $g(x)$.
- Find the x -value(s) of the local maxima of $g(x)$.
- Find the x -value(s) of the local minima of $g(x)$.
- Find the interval(s) where $g(x)$ is increasing.
- Find the interval(s) where $g(x)$ is decreasing.



Problem 7. The function $g'(x)$ is graphed below (i.e., the graph of the *derivative* of $g(x)$). $g(x)$ has domain $(-\infty, 4) \cup (4, \infty)$.



- Find the partition numbers of $g'(x)$.
- Find the critical values of $g(x)$.
- Find the x -value(s) of the local maxima of $g(x)$.
- Find the x -value(s) of the local minima of $g(x)$.
- Find the interval(s) where $g(x)$ is increasing.
- Find the interval(s) where $g(x)$ is decreasing.