

1. Find the intervals on which each function $f(x)$ is increasing or decreasing given $f'(x)$.

a) $f'(x) = 5x^2 + 13x + 8$

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

2. Find the intervals of increase and decrease for the functions:

a) $f(x) = x^4 - 4x^3 - 2x^2 + 12x$

b) $f(x) = 2x\sqrt{9-x}$

3. Given $f(x) = 4x^3 - 3x^2 - 18x + 5$, $-2 \leq x \leq 3$.

i. Find the critical numbers.

ii. Find the regions of increase and decrease.

iii. Find the local and/or absolute maximum and minimum values by using the First Derivative Test.

iv. Sketch $y = f(x)$

4. Given $f(x) = \frac{x^2 - x + 1}{x^2 + 1}$,

i. Find the critical numbers.

ii. Find the regions of increase and decrease.

iii. Find the local and/or absolute maximum and minimum values by using the First Derivative Test.

5. Identify the intervals of concave up and concave down for $y = f(x)$ given $f''(x) = \frac{x^2 + x - 12}{x - 1}$.

6. For the curve $y = 2x^3 - 9x^2 + 12x - 2$, find the local maximum and/or minimum values. Justify using the first or second derivative test.

7. For the curve $y = x^3 - 3x^2 - 9x - 5$

a) Find the intervals of concavity.

b) Find any inflection points.