

The First Derivative Test

Sample:

Group Chat

Consider the function $f(x) = 4 - 3x^2 + x^3$ for $-2 \leq x \leq 3$.

- a** Find and classify the nature of any turning points.
- b** State the intervals for which the function is increasing or decreasing.
- c** State if the points found in part **a** are local or global extrema.

Sample Problem:

Use the derivative to show that the graph of $y = \frac{x-5}{x}$ has no turning points and state the interval(s) where y is increasing/decreasing. Then, sketch the graph of the function.

Group Chat 2

Given $f(x) = \sqrt{2x+4}(5-x)^2$.

a Show that $f'(x) = \frac{(x-5)(5x+3)}{\sqrt{2x+4}}$

i. Using the Product Rule. $f'(x) = u(x) \cdot v'(x) + v(x) \cdot u'(x)$

ii. Using the Quotient Rule. $f'(x) = \frac{v(x) \cdot u'(x) - u(x) \cdot v'(x)}{[v(x)]^2}$

b Find the x-coordinates of any points on the graph of $f(x)$ where the tangent lines are parallel to the x-axis.

c Find which points are maximum and minimum.

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From the Practice Assignment

- 1** For each of the following functions, find and classify any turning points. Confirm your answers graphically.

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

- 3** The cubic function $p(x) = ax^3 + bx^2 + cx + d$ has a tangent with equation $y = 3x + 1$ at the point $(0, 1)$ and has a turning point at $(-1, -3)$. Find the values of a , b , c and d .