

1 5.3: Derivatives and the Shape of Curves

Mean Value Theorem:

Recall 5.1: What f' and f'' say about f :

Second Derivative Test:

Examples:

Determine when the function $f(x) = 2x^4 + 8x^3 + 4$ is increasing, decreasing, concave up, and concave down.

Determine when the function $f(x) = \ln(x^2 + 4x + 5)$ is increasing, decreasing, concave up, and concave down.

On Your Own:

Determine where the function $f(x) = 2 \cos x - \frac{1}{2} \cos(2x)$ is increasing, decreasing, concave up, and concave down on the interval $0 \leq x \leq 2\pi$.

increasing $(\pi, 2\pi)$; decreasing $(0, \pi)$; concave up $\left(\frac{\pi}{3}, \frac{5\pi}{3}\right)$; concave down $\left(0, \frac{\pi}{3}\right) \cup \left(\frac{5\pi}{3}, 2\pi\right)$.