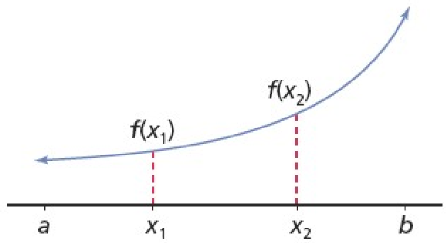
INTERVALS OF INCREASE AND DECREASE

Recall the following definition:

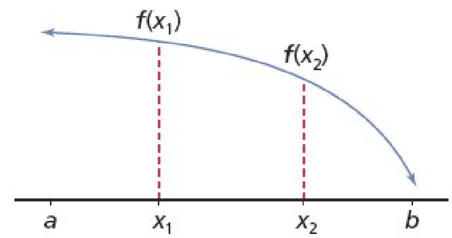
Definition of Increasing and Decreasing Functions

A function $f(x)$ is **increasing** on the interval $I\ (a < x < b)$, if $f(x_1) < f(x_2)$ for all pairs of numbers x_1 and x_2 in I such that $x_1 < x_2$.



Function f increases on an interval if the values of $f(x)$ increase as x increases.

A function $f(x)$ is **decreasing** on the interval $I\ (a < x < b)$, if $f(x_1) > f(x_2)$ for all pairs of numbers x_1 and x_2 in I such that $x_1 < x_2$.



Function f decreases on an interval if the values of $f(x)$ decrease as x increases.

Using the Derivative…

Do you know where this is leading already? If a function is increasing, the tangent slope must be greater than 0. If a function is decreasing the tangent slope must be less than 0. How does this relate to the derivative?

Test for Increasing and Decreasing Functions

If $f'(x) > 0$ for all x in that interval, then f is *increasing* on the interval $a < x < b$.
If $f'(x) < 0$ for all x in that interval, then f is *decreasing* on the interval $a < x < b$.

Examples

1) Find the intervals of increase and decrease of $g(x) = x^2 - 2x + 3$.

2) Find the intervals of increase and decrease of $f(x)=\dfrac{x^4}{4}-2x^3+\dfrac{5}{2}x^2+12x+8$.

3) Find the intervals of increase and decrease of $f(x)=\dfrac{x}{x^2+1}$.