# CALCULUS

## *Chapter 4 –Curve Sketching*

(*Material adapted from Chapter 4 of your text*)

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# Chapter 4 – Curve Sketching

*Contents with suggested problems from the Nelson Textbook (Chapter 4)*

# 4.1 Intervals of Functional Increase and Decrease

In this chapter we will concern ourselves a little more with **Functional Behaviour.**

Consider the picture:
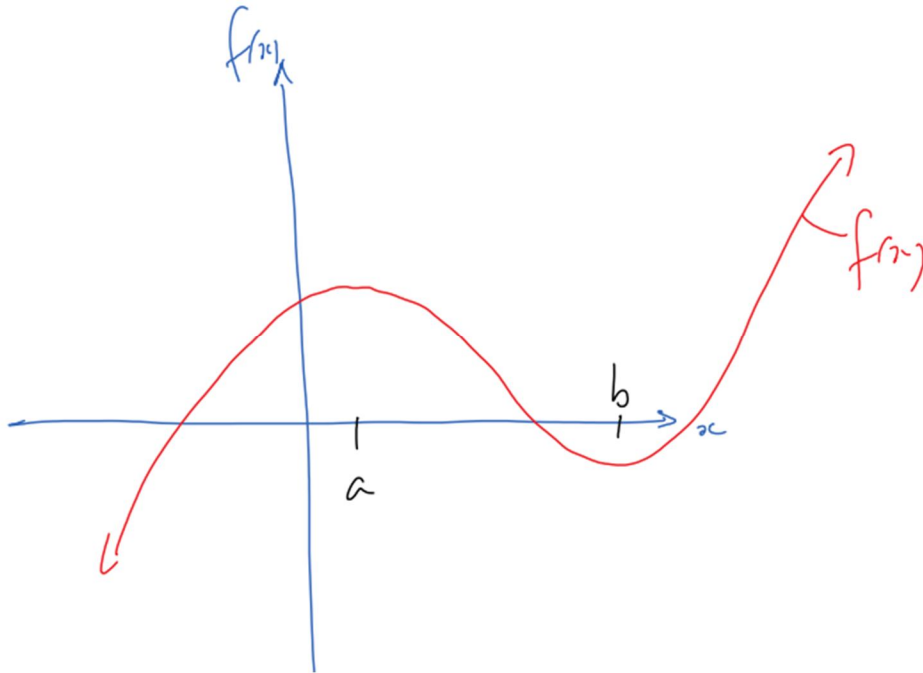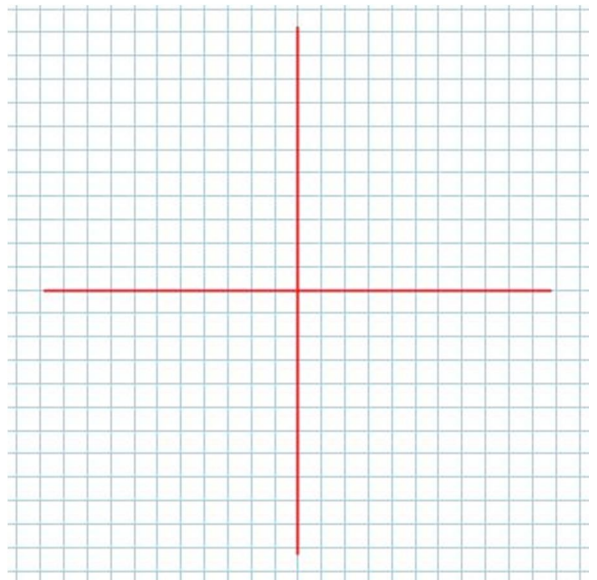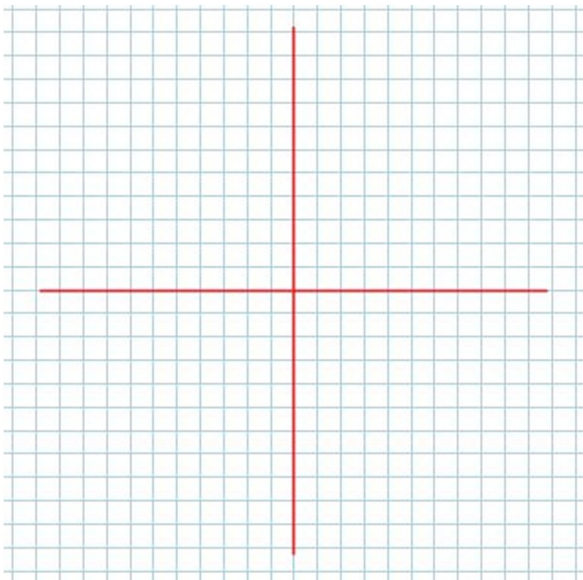


Clearly, $f(x)$ is increasing on
and decreasing on

Note: At

**Definition 4.1.1**

1) A function $f(x)$ is said to be **increasing** on the **open interval** $(a,b)$ if

2) A function $g(x)$ is said to be **decreasing** on the **open interval** $(a,b)$ if

Pictures

*While Definition 4.1.1 is true, it's not very "fun" to work with. Perhaps there is something better!*

# The First Derivative Test

Given some differentiable function, $f(x)$, we can **use its first deriva**tive **to determine** where the function is **increasing and decreasing**. Furthermore, we can **use that information to test whether a critical value is the location of a local maximum or a local minimum** (more on that later).

Picture
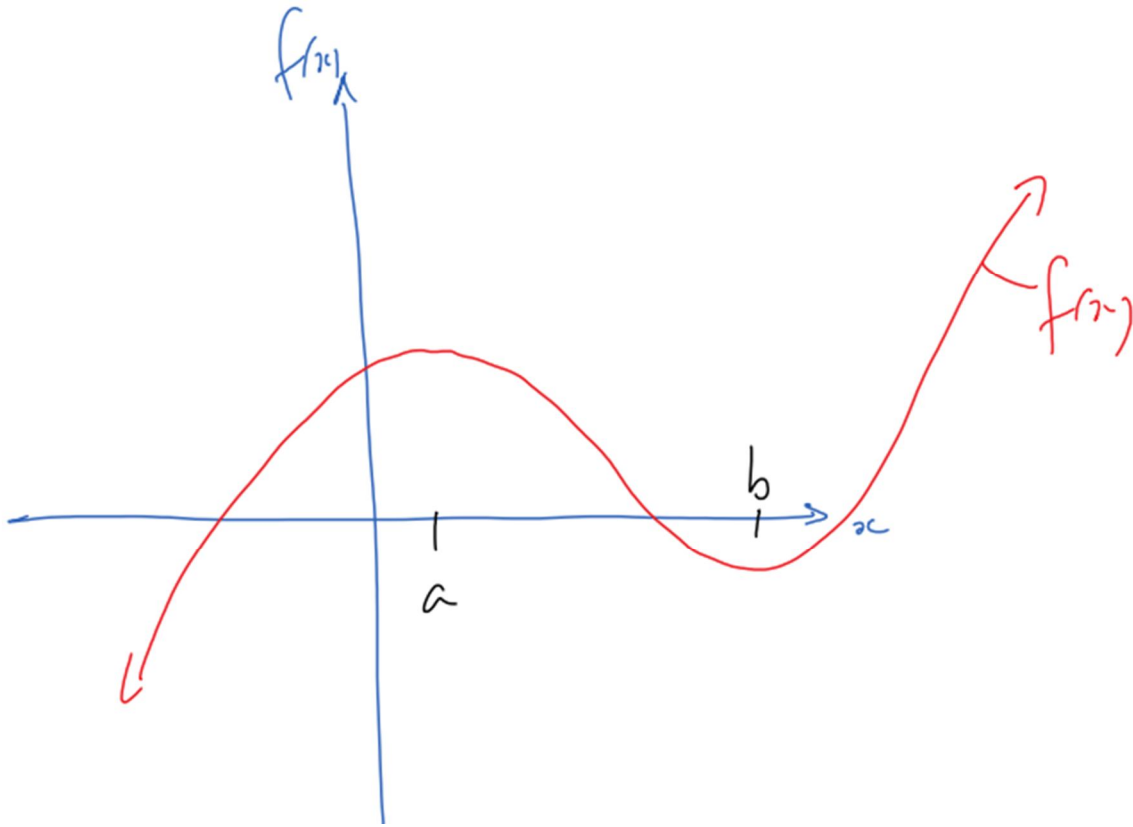
**Definition 4.1.2** (Calculus point of view)

Given a differentiable function, $f(x)$, whenever

Whenever

**Example 4.1.1**

Determine the intervals of increase and decrease for the polynomial function

$$f(x) = x^5 - 5x^4 + 100$$

**Example 4.1.2**

Determine the intervals of increase and decrease for the function $g(x) = x + \dfrac{1}{x}$.

> *Class/Homework for Section 4.1*
>
> *Pg. 169 – 171  #1, 3 – 6, 8, 10 – 12*