

Lab Session 8: Project

Description

Numerical integration is widely employed to calculate the numerical value of a definite integral. One engineering application of numerical integration is to approximate the area bounded by a curve and lines.

In this project, you have to develop an algorithm (or technique) to approximate the area between the curve defined by the function $f(x)$, the x-axis, and the two lines $x = 0$ and $x = b$, where $b \in [2, 4]$, i.e. the stripped area in the following figure.

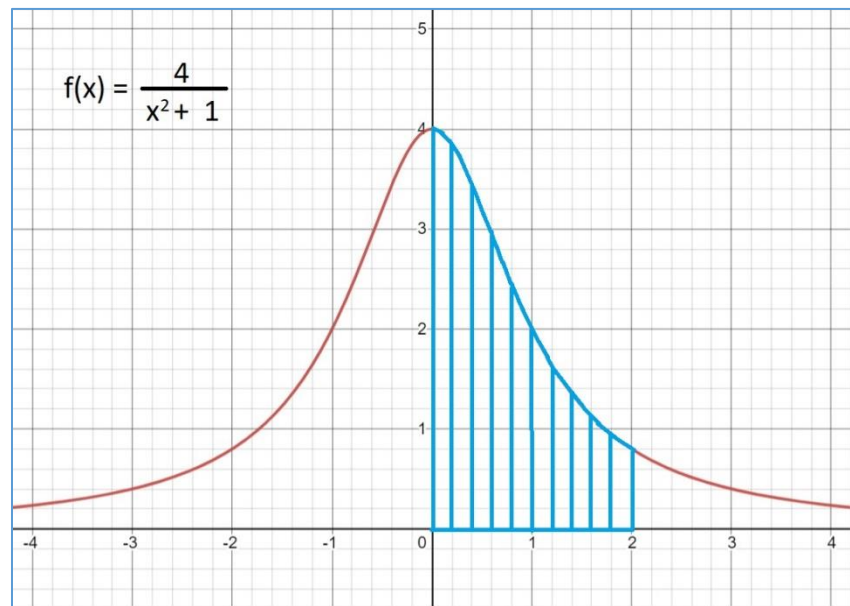
Sample Input:

$b = 2$

$n = 10$

Sample Output:

Area = 4.58806167



Requirements

1. Write an MIPS assembly program to calculate the stripped area using any area approximation methods (e.g. rectangle/trapezoid method, Simpson's method, etc.).
 - **Input:**
 - b (as described above)
 - n – the number of small rectangles/trapezoids that shape the stripped area to adjust the accuracy of area calculation, $n \in \mathbb{N}$, $10 \leq n \leq 20$.
 - **Output:**
 - The stripped area.
2. Write a report and submit **a hard copy** that includes:
 - The study on floating-point arithmetic on an MIPS computer.
 - The proposed algorithm/implementation and analysis in the state of the MIPS computer (e.g. the state of memory and registers).