Lab #1

MATH 345 - Numerical Analysis I

Instructor: Cesar Aguilar

Department of Mathematics, SUNY Geneseo

Suppose that you need a loan in the amount of $P = 210,000$ that will be paid over $m = 30$ years at an annual interest rate $i \in [10^{-5}, 0.2]$. The amount that you can afford to repay the loan is a monthly amount of $A = 1,200$. It can be shown (you do not have to show this) that P, m, A and i are related by the equation

$$P = \frac{A}{(i/12)} \left[1 - \left(1 + \frac{i}{12} \right)^{-12m} \right].$$

Find an approximation i^* to the interest rate i using the Bisection method. Find i^* so that

$$|i - i^*| < 10^{-15}$$

and write out i^* using 12 decimal places. How many iterations of the Bisection algorithm are needed to compute i^*?