Design of Lab5– Jacob Bollinger

Problem:

Design software to calculate continued fractions for a real number and for a rational number.

Plan:

I will start by defining a function named findContinuedFraction. This function will take the input parameters a and b. Start it off by initializing continuedFraction. Set the searching variable equal to True. Use a while loop to run while searching is equal to True. Inside of the while loop set the variable integer equal to a // b. Set the variable a equal to itself minus integer times the variable b. Set a and b equal to b and a. Assign the continuedFraction variable to be itself plus a space plus the integer as a string. Lastly set searching equal to b is not equal to zero. Finish the function with return continuedFraction.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| a | b | integer part | fractional part | reciprocal |
| 13 | 7 | 1 | 13/7 – 1 = 6/7 | 7/6 |
| 7 | 6 | 1 | 7/6 – 1 = 1/6 | 6/1 |
| 6 | 1 | 6 | 6 – 6 = 0 | 0 |

I next will create a function named findRealContinuedFraction with parameters r and steps. Start it by initializing continuedFraction. Then I’ll create a for loop that will run steps times. In the for loop set the variable integer equal to r as an integer. Next set r equal to itself minus integer. Find the reciprocal of r by setting r equal to one divided by r. Assign the continuedFraction variable to be itself plus a space plus the integer as a string. Set i equal it itself minus one. Finish the function by returning the variable continuedFraction.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| steps | r | integer part | fractional part | reciprocal |
| 5 | 2^1/3 | 1 | 2^1/3 – 1 = 0.2599210498948732 | 3.8473221018630723 |
| 4 | 3.8473221018630723 | 3 | 3.8473221018630723 – 3 = 0.8473221018630723 | 1.1801887355484095 |
| 3 | 1.1801887355484095 | 1 | 1.1801887355484095 – 1 = 0.1801887355484095 | 5.5497364857823746 |
| 2 | 5.5497364857823746 | 5 | 5.5497364857823746 – 5 = 0.5497364857823746 | 1.8190533571313152 |
| 1 | 1.8190533571313152 | 1 | 1.8190533571313152 – 1 = 0.8190533571313152 | 1.2209216790252095 |

Next I will create Input variables. I will create a variable N1 and N2 to be the numerator and denominator for findContinuedFraction. I will also create the variables R and STEPS. These will be the variables for findRealContinuedFraction. R will be a real number and STEPS will be how many times the function runs.

I will finish off the program by creating and labeling outputs. Label a print statement as Continued fraction of N1 / N2. In the print statement should be a string Continued Fractions: followed by findContinuedFractions which will use N1 and N2 as input parameters. Label a second print statement as Real continued fraction of R for STEPS times. In the4 print statement should be a string Real Continued Fraction: followed by findRealContinuedFractions which will take R and STEPS as input variables.