

SAMPLE HOMEWORK PROBLEM

Title: Find the derivative of a continuous function within a pre-specified tolerance

Background

To calculate the derivative of a function, $f(x)$ at a point, x , we can use the approximation

$$f'(x) \approx \frac{f(x+dx) - f(x)}{dx}$$

Specifications

Input variables to the MATLAB function *mydiff* are

- function, f
- point at which $f'(x)$ is desired, x
- initial step size, dx
- pre-specified tolerance, tol

Stopping criteria is if pre-specified tolerance, tol (given in percentage) is met. The percentage absolute relative approximate error $|\varepsilon_a|$ is defined as

$$|\varepsilon_a| = \left| \frac{\text{Present Approximation} - \text{Previous Approximation}}{\text{Present Approximation}} \right| \times 100.00. \text{ If } |\varepsilon_a| \text{ is less than}$$

the pre-specified tolerance, then the pre-specified tolerance is met.

Return the following as output of *mydiff*

- estimated value of the derivative of the function

Procedure skeleton

```
dydx:=proc(f, xi, dx, tol)
.....
.....
return (fp)
end proc
```

Pseudo-Code

Submit a pseudo-code for the function

Testing the procedure

Conduct tests to see if all parts of the procedure are working in a separate Mfile.

What to submit

1. The Mfile of the function *mydiff*
2. The published file to test the function *mydiff*

Expected items are your name and section number in all printouts and comment statements