

Numerical Methods - Assignment 4

Due Thursday, Sep 19

1 - Implement the trapezoid method in Matlab, as a function

```
trapezoid( f , a , b , n )
```

that estimates the integral $\int_a^b f$ using the composite trapezoid method in n steps. When calling the function, `f` should be replaced by a handle, like `@exp` (see `function_handle` in the Matlab help).

2 - Test your function to estimate the integrals $\int_0^1 e^x dx$ and $\int_0^1 \frac{\sin x}{x} dx$ with various values of n . Compare with the results returned by Matlab's `integral` function. Comment. You will need to define a function `divsine(x)` that returns 0 if $x = 0$ and $\frac{\sin x}{x}$ otherwise.

3 - (optional) Implement the extrapolation method, as a function

```
extrapol( f , a , b , n , k )
```

where k is the number of times that you perform the extrapolation method. The function should return or print the Romberg table. Test for the above integrals with $n = 4$ and $k = 4$, and comment.