

## Lab-08

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1. Consider the function  $f(x) = xe^x$ . Write a MATLAB function that will return the numerical derivative of this function at the point  $x = 1$  using a step size of  $h = 0.0001$  by the following methods: (a) Forward difference (b) Backward difference (c) Central difference (d) Richardson extrapolation (Four point). Compare the results you get in each case with the actual value. Are the errors in each case along the expected lines? See how the error scales with  $h$ .
2. Give below is the data for time vs. height of a projectile. Fit a quadratic to the position data using least square and find  $g$ .

$t = [0.00:0.10:1.0]$

$h = [1.67203, 1.79792, 2.37791, 2.66408, 2.11245, 2.43969, 1.88843, 1.59447, 1.79634, 1.07810, 0.21066]$

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