**LECTURE ASSIGNMENT 1**

Polynomial interpolant to dataset is the simplest possible continuous polynomial giving the prescribed values at the grid points, i.e.,  for all indices. Use the Lagrange interpolation polynomial on a regular grid of spacing  to find the three point backward, central, and forward difference formulas for the first and second derivatives at point *i*.

Name**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Student number**\_\_\_\_\_\_\_\_\_\_\_\_\_**

Backward difference approximations use dataset . Central difference approximations use dataset . Forward difference approximations use dataset . Interpolants to the datasets follow straightforwardly by using the Lagrange interpolation polynomial:

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Thereafter, using the definitions , , , ,

, and  (origin is placed at point *i*):

Backward Central Forward

   

   