MATH 351   Introduction to Numerical Analysis

Graduation Exam, 2019 Fall

1. Find the Lagrange and Newton interpolating polynomials for these data:

x	0	1	2	3
$f(x)$	-4	3	2	5

2. Derive the approximation to $f'(x)$ based on three points $x - 2h, x - h, x$ for some $h > 0$ and show that the error term is $O(h^2)$ as $h \to 0$.

3. Find a formula
$$\int_{-1}^{1} f(x)dx \approx w_1 f(x_1) + w_2 f(x_2)$$
that is exact for all $f \in \Pi_3$ where Π_3 is the set of polynomials of degree at most 3.