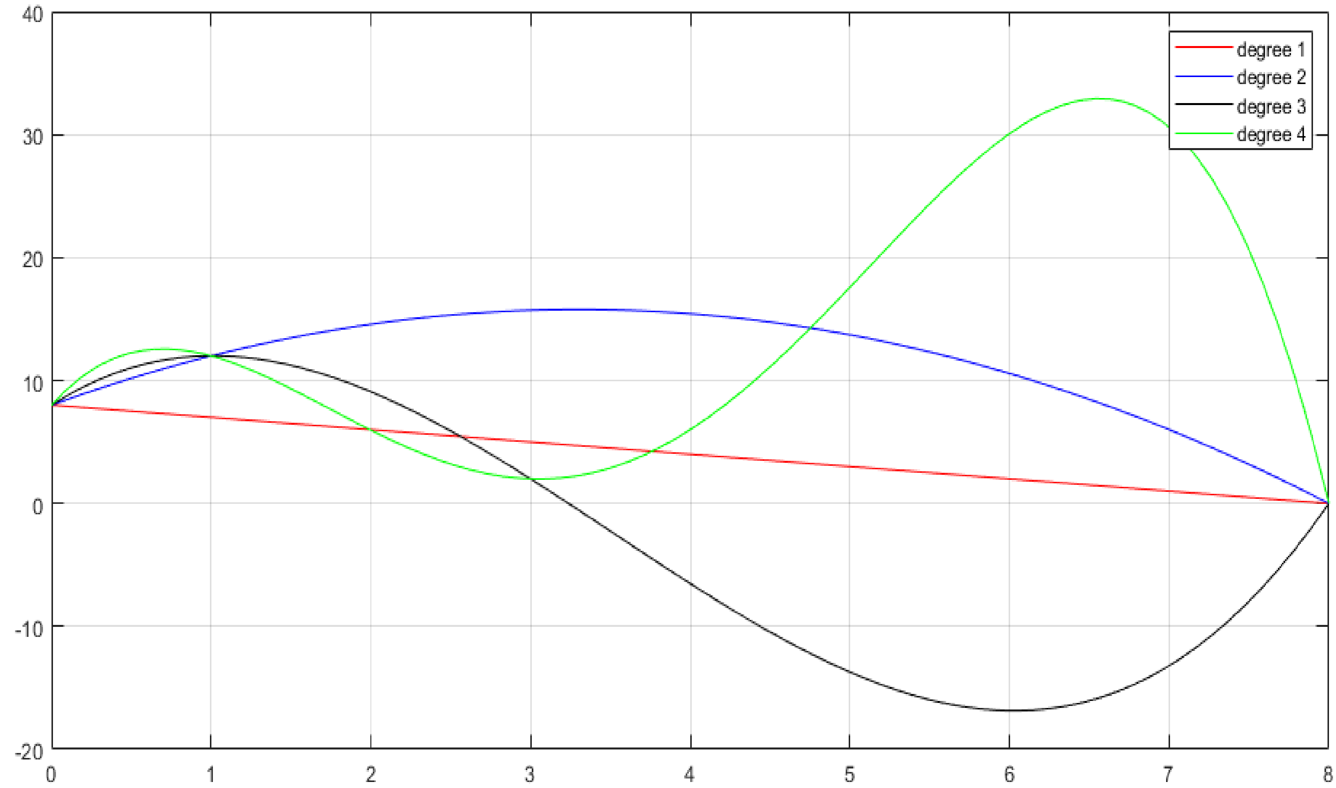
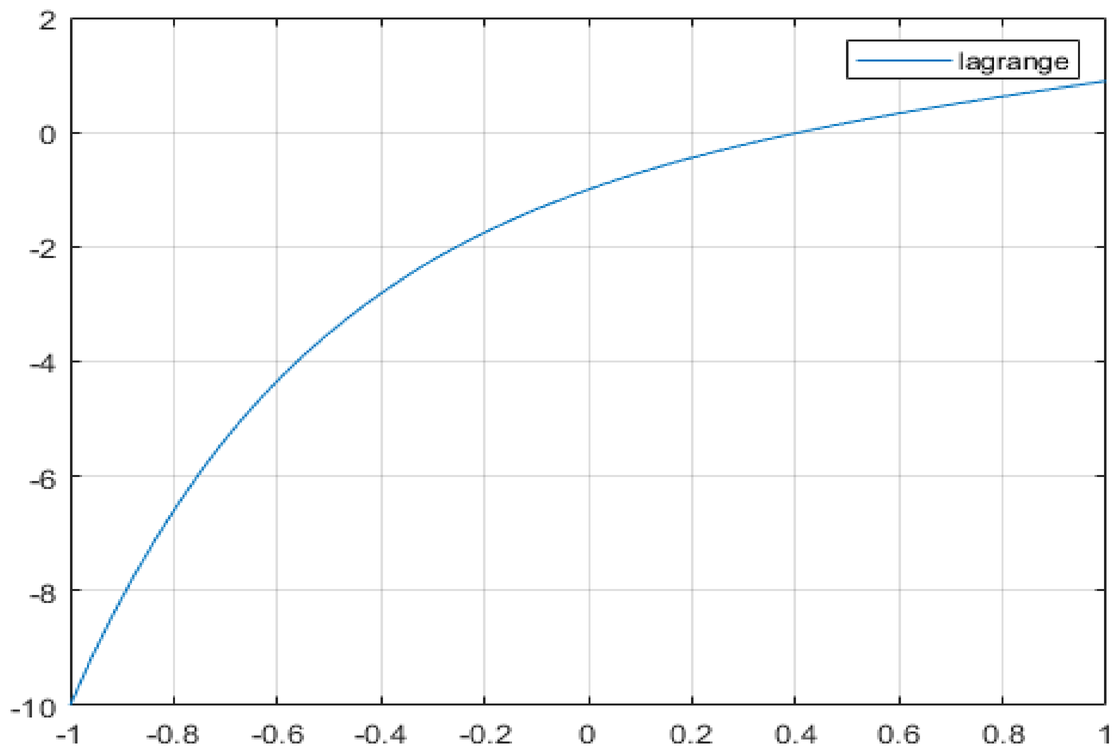
LAB 7

1. The polynomial interpolation for 2,3,4 and 5 pts is shown in the graph below
   We see different degree polynomial plots in each cases with increasing accuracy.

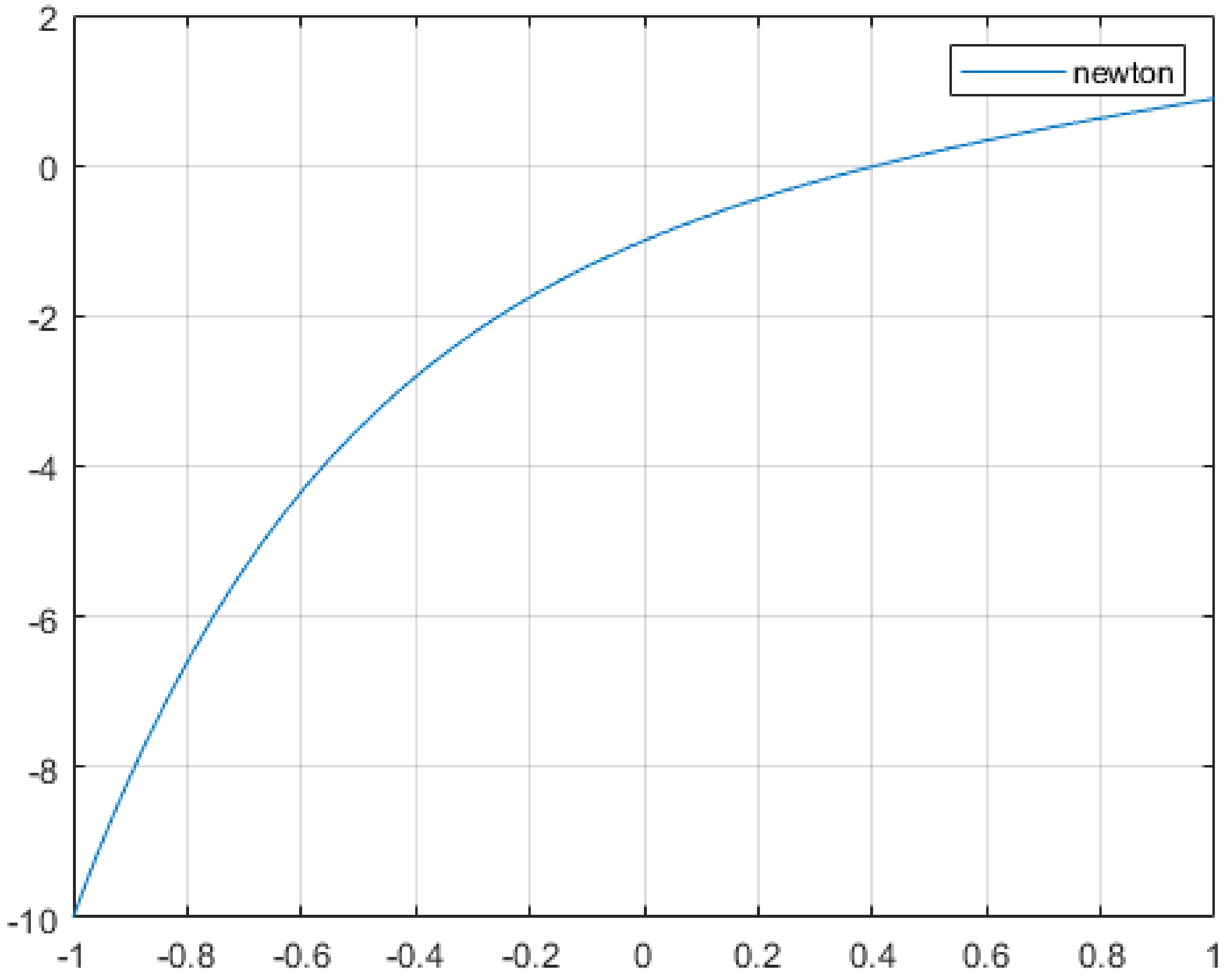


2. Approximate root found out by setting the interpolating polynomial to 0 is 0.408.
   Applying newton's method to find root in the original function, we get root = 0.408
   From the graphs, we also see that the root = 0.4 (approx).

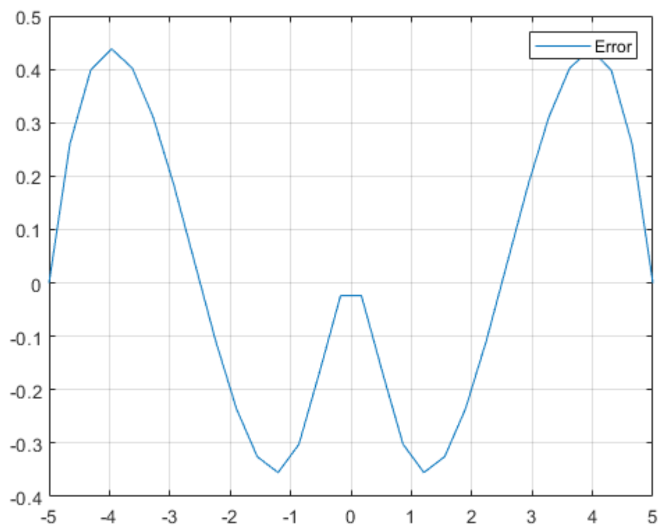
   Plot for lagrange:

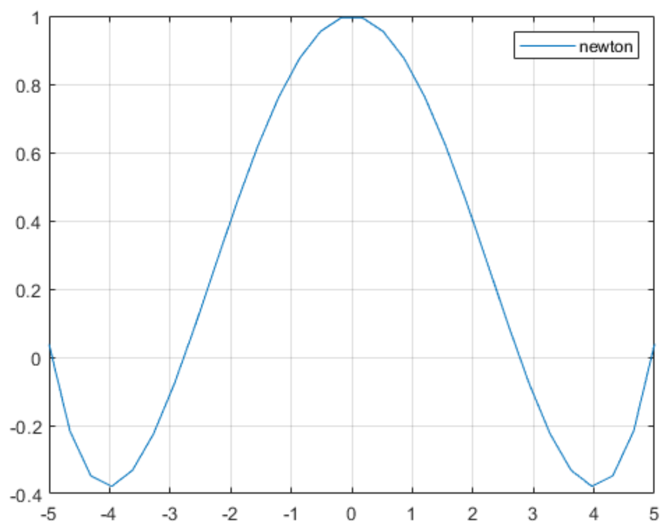


Plot for Newton:

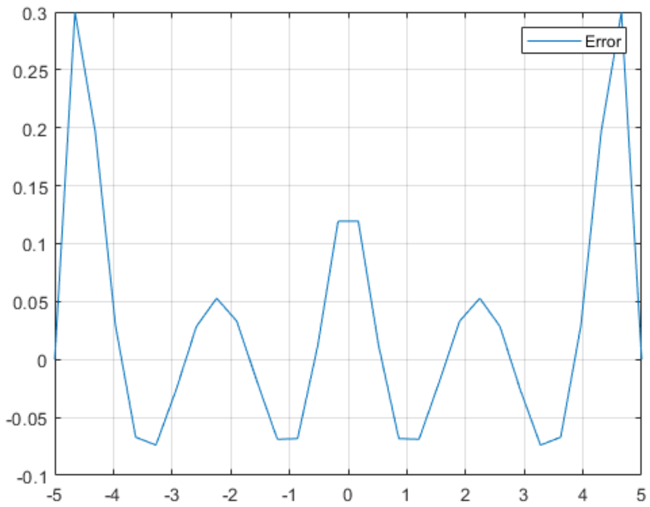


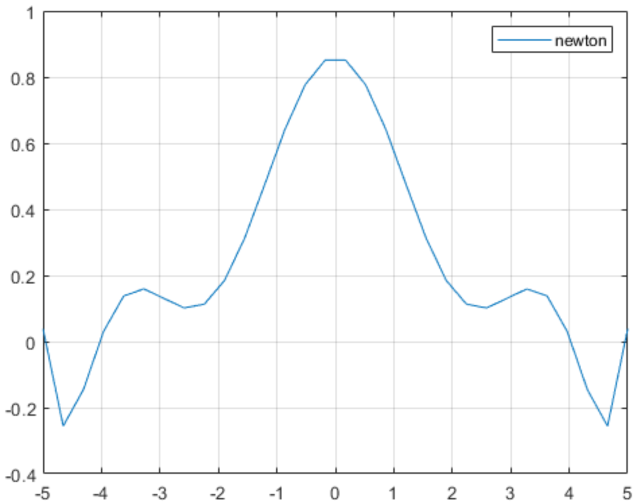
3. Error and corresponding interpolated polynomial for n = 5



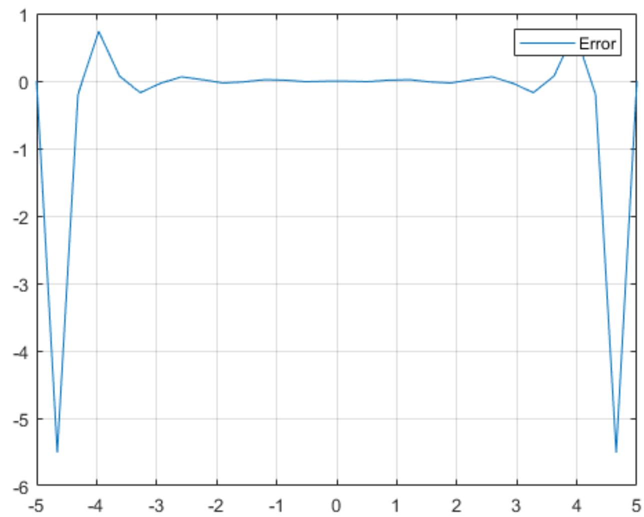


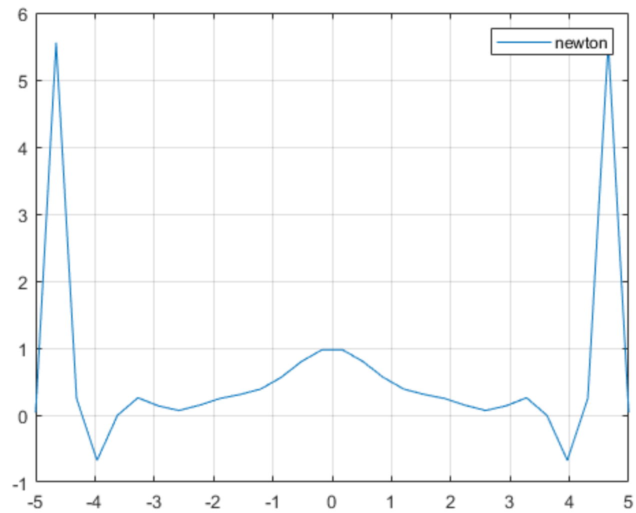
Error and corresponding interpolated polynomial for n = 10





Error and corresponding interpolated polynomial for n = 15





Hand calculations are attached below:

① $p_1(x) = -x + 8$

$p_2(x) = -0.714x^2 + 4.714x + 8$

$P_3(x) = 0.457x^3 - 4.828x^2 + 8.371x + 8$

$P_4(x) = -0.2607x^4 + 3.58x^3 - 13.95x^2 + 14.628x + 8$

② Lagrange:

$$p(x) = -0.00024x^{10} + 0.0023x^9 - 0.012x^8 + 0.048x^7 - 0.155x^6 + 0.426x^5 - 0.971x^4 + 1.787x^3 - 2.413x^2 + 3.197x - 1$$

Newton:

$$p(x) = -1 + 2.97(x-0) - 1.945(x-0)(x-0.1) + 1.27(x-0)(x-0.1)(x-0.2)$$
$$\vdots$$
$$-0.0056(x-0)\cdots(x-0.8)$$
$$-0.0024(x-0)\cdots(x-0.9)$$

Both of them are the same which is verified from the graph

③ Oscillation at edges can be seen. As n is increased, the error at edges increases. However middles values become more accurate.

Teacher's Signature