**ACS234 Tutorial Week 3 (Interpolation)**

# PROBLEMS

**Problem 1**: Consider the data points below

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x* | 0 | 2 | 3 | 4 |
| *y* | 7 | 11 | 28 | 25 |

1) Determine the coefficients, *a*1, *a*2, *a*3, *a*4, of the 3rd-order Newton interpolating polynomial P3(x) of the form below:



2) Evaluate the value of y at *x*=1 using P3(x).

3) Is the value given by the 3rd-order polynomial the same as that given by the 2nd-order one?

**Problem 2**: Consider the 2nd- order Newton’s interpolating polynomial give by Eq. (2.14). Show that the

the third coefficient of this polynomial is



**Problem 3 (Polynomial Interpolation)**: Consider the following data points:

|  |  |  |  |
| --- | --- | --- | --- |
| *x* | 0 | 1 | 2 |
| *y* | 0 | 4 | 0 |

1. What is the minimum degree (minimum integer *n*) of the polynomial of the form below that interpolate all the three data points?

1. What is the polynomial function?

**Problem 4 (Lagrange Interpolation)**: Consider the following data points:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *x* | -1 | 0 | 1 | 2 |
| *y* | 3 | -4 | 5 | -6 |

We want to find a Lagrange interpolating polynomial of degree 3 to interpolate all the four data points.

1. Determine the four Lagrange basis (elementary) polynomials of the form below:
2. Check the Lagrange polynomial below passes through all the four data points: