CO21BTECH11002

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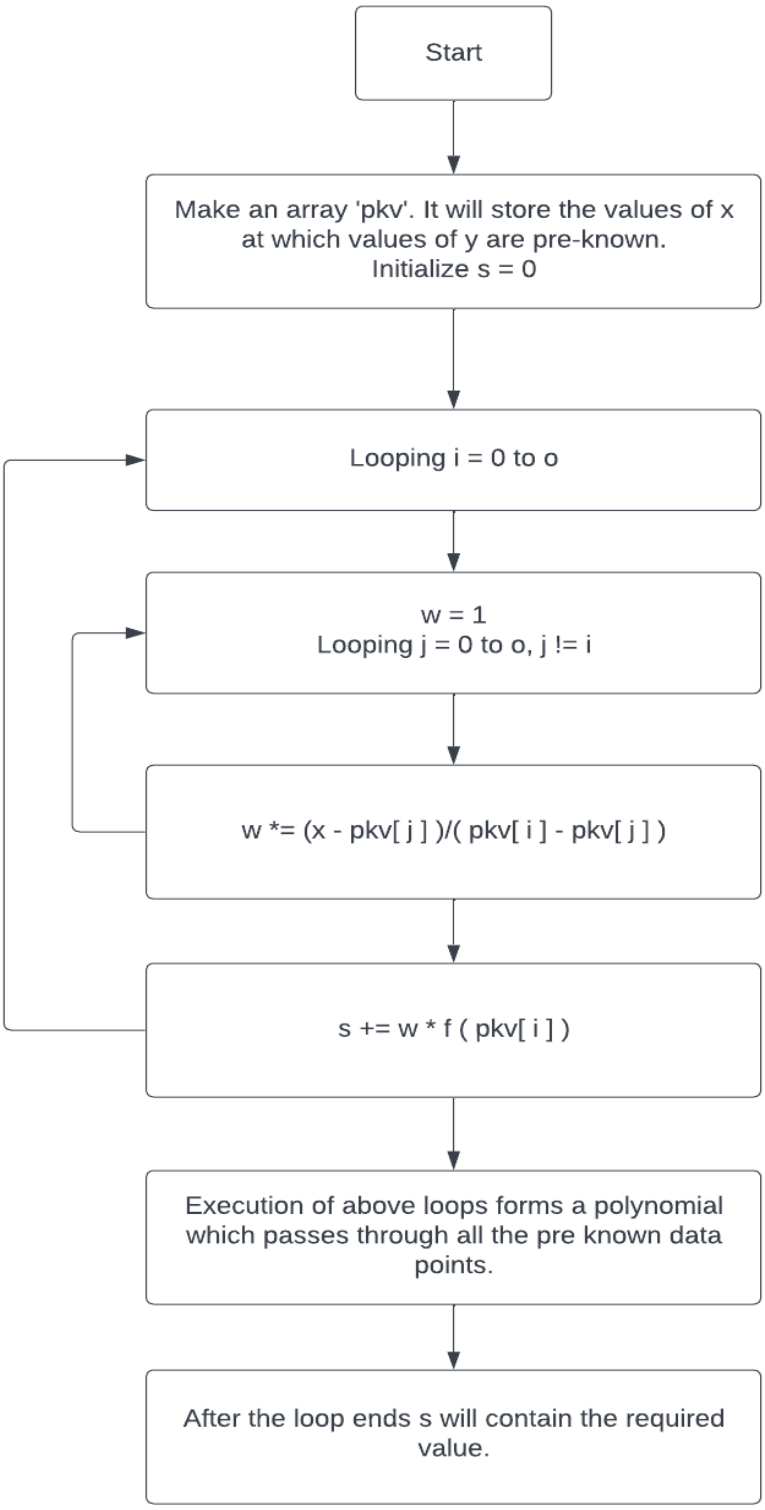
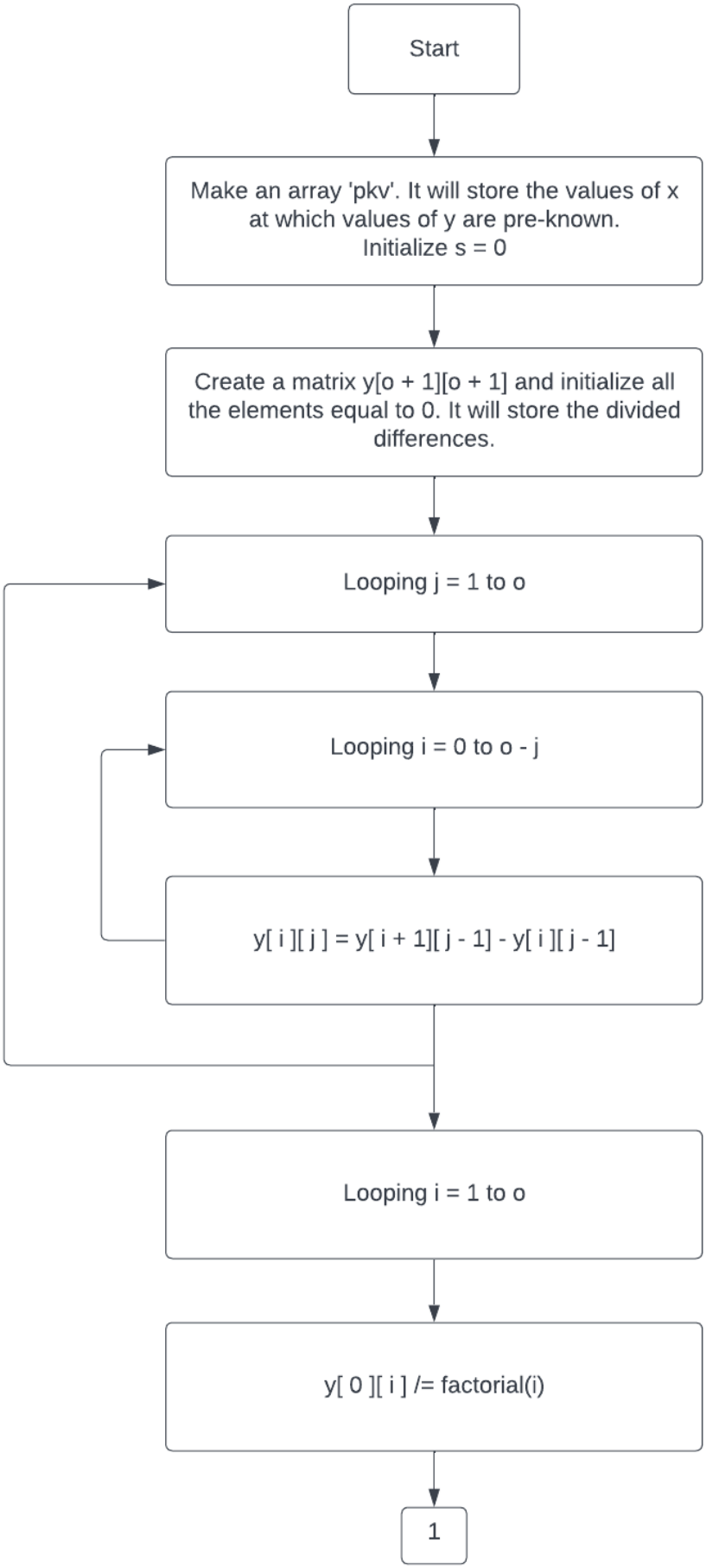
Assignment – Eigenvalues

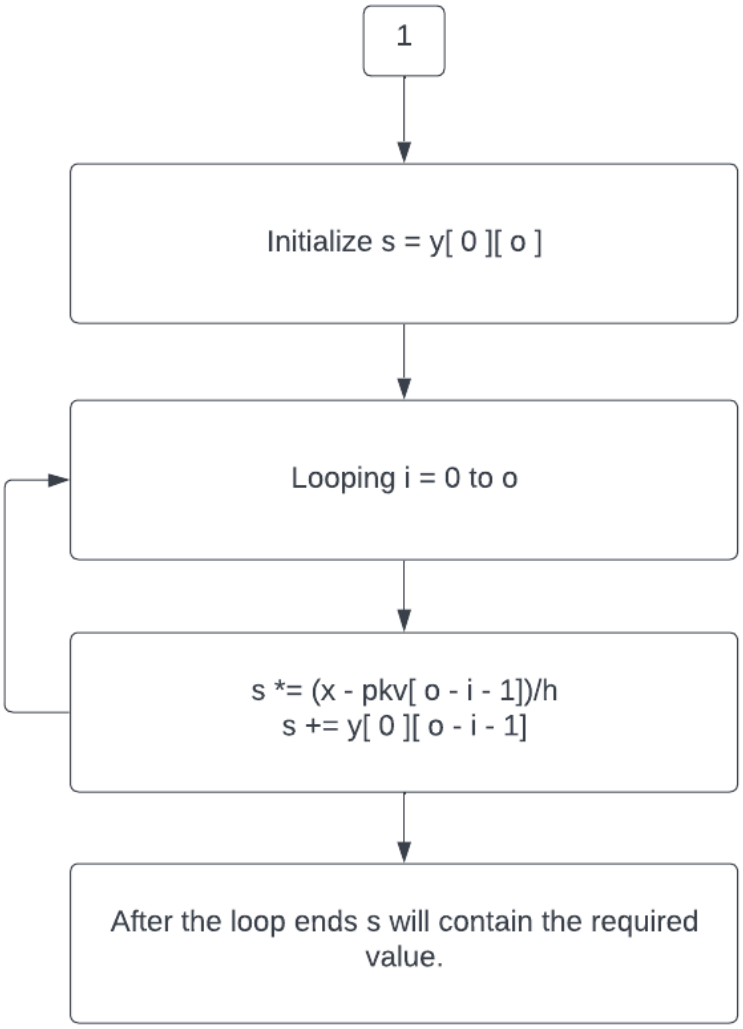
Algorithm:

1) Using Lagrange Polynomial:



2) Using Newton's Polynomial:





Output:

Both the polynomials have order 'o' and passes through $(o + 1)$ *given data points. In fact being expanded in powers of* x*, Newton polynomial is the same as the Lagrange polynomial. Therefore, the error of Newton interpolation is also the same as error of the Lagrange interpolation. The difference between Newton and Lagrange interpolating polynomials lie only in the computational aspect. The advantage of Newton interpolation is the use of nested multiplication and relative easiness to add more data points for higher − order interpolating polynomials.*

x	Method	Order	h	Value	Error
1.53	Lagrange Interpolation	2	0.1	2.400892633	-0.0044004770
			0.05	2.4007770199	-0.0005582266
		4	0.1	2.4007638942	-0.0000114947
			0.05	2.4007636273	-0.0000003774
	Newton Interpolation	2	0.1	2.400892633	-0.0044004770
			0.05	2.4007770199	-0.0005582266
		4	0.1	2.4007638942	-0.0000114947
			0.05	2.4007636273	-0.0000003774
2.01	Lagrange Interpolation	2	0.1	3.9929707066	-0.0038845345
			0.05	3.9928352800	-0.0004927763
		4	0.1	3.9928160095	-0.0000101470
			0.05	3.9928156176	-0.0000003331
	Newton Interpolation	2	0.1	3.9929707066	-0.0038845345
			0.05	3.9928352800	-0.0004927763
		4	0.1	3.9928160095	-0.0000101470
			0.05	3.9928156176	-0.0000003331
2.76	Lagrange Interpolation	2	0.1	8.0977857944	-0.0034901476
			0.05	8.0975390309	-0.0004427460
		4	0.1	8.0975039178	-0.0000091168
			0.05	8.0975032038	-0.0000002993
	Newton Interpolation	2	0.1	8.0977857944	-0.0034901476
			0.05	8.0975390309	-0.0004427460
		4	0.1	8.0975039178	-0.0000091168
			0.05	8.0975032038	-0.0000002993

$When\ using\ 2nd\ order\ polynomial\ error\ reduces\ by\ about\ 8\ times\ when\ reducing\ h\ by\ 2.$

$Hence\ order\ of\ accuracy\ =\ 3$

$When\ using\ 4th\ order\ polynomial\ error\ reduces\ by\ about\ 32\ times\ when\ reducing\ h\ by\ 2.$

$Hence\ order\ of\ accuracy\ =\ 5$