Math 411 Hwk 3

Problem 1. *Write a Matlab function* `intVandermonde`*, which takes as input the interpolation points* $\{(\hat{x}_k, \hat{y}_k)\}_{k=0}^{n}$ *and the sample points* $\{x_j\}_{j=1}^{m}$*, and uses the Vandermonde interpolation method to return the values* $\{y_j\}_{j=1}^{m}$ *so that* $y_j = p(x_j)$ *for each* $j = 1, \ldots, m$*, where* $p(x)$ *is the unique interpolating polynomial.*

Problem 2. *Write a Matlab function* `intLagrangian`*, which takes as input the interpolation points* $\{(\hat{x}_k, \hat{y}_k)\}_{k=0}^{n}$ *and the sample points* $\{x_j\}_{j=1}^{m}$*, and uses the Lagrangian interpolation method to return the values* $\{y_j\}_{j=1}^{m}$ *so that* $y_j = p(x_j)$ *for each* $j = 1, \ldots, m$*, where* $p(x)$ *is the unique interpolating polynomial.*

Problem 3. *Write a Matlab function* `intNewton`*, which takes as input the interpolation points* $\{(\hat{x}_k, \hat{y}_k)\}_{k=0}^{n}$ *and the sample points* $\{x_j\}_{j=1}^{m}$*, and uses the Newton interpolation method to return the values* $\{y_j\}_{j=1}^{m}$ *so that* $y_j = p(x_j)$ *for each* $j = 1, \ldots, m$*, where* $p(x)$ *is the unique interpolating polynomial.*

Problem 4. *Compare the run times of the above three functions by writing a Matlab script that interpolates the randomly generated sequence* $\{(k, y_k)\}_{k=1}^{n}$*. Make a formal study and report your conclusions.*