Q1. Theory. a. Consider a 1-D interpolation using a quadratic polynomial. Assume that n X-coordinates are available $\{(x1) \ldots (xn)\}$. The respective pixel values at these points are $\{v1,\ldots, vn\}$. Derive an equation for obtaining the coefficients of the polynomial in terms of given coordinates and pixel values. [.5]

Theory. b. Using the derived expression from (a), interpolate the following

v	**2**	5	1	0
x	**0**	1	2	3

Top row gives pixel values and bottom row gives X-coordinate. Use interpolation factor as 0.75. You can use the same coefficients for interpolation at all points. Note, you need to interpolate at all points where the pixel value can be non-zero. Assume zero padding for coordinates outside the given ones. [.5]

Q2. Theory. a. Give below is a 3x4 image. Bold is origin.

2	0	0	0
0	1	3	1
3	0	2	0

Interpolate it by a factor of 0.75 on both X and Y. Compute the interpolation only for output coordinates (1,1) and (2,2).
Note that for each point, interpolation coefficients need to be computed. [1]

b. Write a code which performs bilinear interpolation for the entire 3x4 matrix given in (a) using interpolation factor 0.75. Does the interpolation result match with the computed result in (a)? Use zero padding for coordinates outside given matrix. Note you must compute interpolation coefficients via the equations derived in the lecture. And this should reflect in the code. Display the output. [2]

c. Now perform the bilinear interpolation for Barbara image for interpolation factor 0.2. Note you must compute interpolation coefficients via the equations derived in the lecture. And this should reflect in the code. Use zero padding for coordinates outside given matrix. [2]