For N=3 and M=4,

1. write a MATLAB code:

a) Define NxM-dimensional matrix A and M-dimensional vector b

b) Construct row vectors $a_r^n$ for $n=1,\ldots,N$, and column vectors $a^c_m$ for $m=1,\ldots,M$ of A (what is the dimension of $a_r^n$ and $a^c_m$?)

2. Write “function codes” that compute $c=A \cdot b$ (what is the dimension of $c$?) by
   a) Brute force (i.e., element by element)
   b) Row-oriented approach
   c) Column-oriented approach

3. Verify your “function codes” against MATLAB operation $c = A \cdot b$ using

   \[
   nA = \sqrt{3} \cdot [1:1:3]';
   mA = \sqrt{2} \cdot [0:1:3];
   mb = [1 4 5 2]';
   \]

   \[
   A = \sin(pi \cdot nA) \cdot \cos(pi \cdot mA);
   b = \cos(mb);
   \]

4. Plot
   a) $[1:1:M]$ vs $a_r^n$ for $n=1:N$ in one figure with
      - x axis between [1 N] & y axis between [-1 1]
   b) $a^c_m$ vs $[1:1:N]'$ or $m=1:M$ & $b$ in one figure with
      - x axis between [-1 1] & y axis between [1 M]

For both figures
   - change color & add a circle at the data point for each line
   - put x and y labels with fontsize 12