1. (20 points) Let a and x_i be vectors and b_i be a scalar for all i.

   Minimize

   $$E(\mathbf{a}) = \frac{1}{2n} \sum_{i=1}^{n} (\mathbf{x}_i^T \mathbf{a} - b_i)^2$$

2. (20 points) Draw a flow chart to illustrate minimizing E(a) by the gradient descent method.

3. (20 points) Implement your flow chart by Matlab codes.
   Checked by_____time_____

4. (40 points) Use the following codes to generate x and z and apply codes in 3 to reconstruct linear transformation between x and z.
   Checked by_____time_____

```
x=rand(400,2);
z(:,1) = 2*x(:,1)+x(:,2)-1;
z(:,2)=x(:,1)-x(:,2)+1;
```