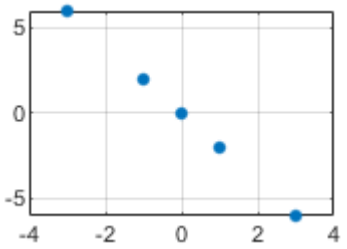
```
clear;

points = [0 0; -1 2; -3 6; 1 -2; 3 -6];

plot(points(:,1),points(:,2),'.', 'MarkerSize', 15);
grid on;
```




```
load USPS.mat
disp("Original first and second images:")
```

```
Original first and second images:
```

```
A1 = reshape(A(1, :), 16, 16);
imshow(A1')
```

```
A2 = reshape(A(2, :), 16, 16);
imshow(A2')
```

```
AA = A;
for i=1:256
    AA(:, i) = A(:, i) - mean(A(:, i));
end
```

```
[u,s,v] = svd(AA);


pc10 = v(:, 1:10);
data10 = A * (pc10 * pc10');

disp("10 principal components images 1 and 2:")
```

```
10 principal components images 1 and 2:
```

```
t1 = reshape(data10(1, :), 16, 16);
imshow(t1')
```

```
t2 = reshape(data10(2, :), 16, 16);
imshow(t2')
```

```


error = norm(A - data10);
disp("The reconstruction error for 10 principal components is:")
```

```
The reconstruction error for 10 principal components is:
```

```
disp(error)
```

```
  222.8360
```

```


pc50 = v(:, 1:50);
data50 = A * (pc50 * pc50');

disp("50 principal components images 1 and 2:")
```

```
50 principal components images 1 and 2:
```

```
t1 = reshape(data50(1, :), 16, 16);
imshow(t1')
```

```
t2 = reshape(data50(2, :), 16, 16);
imshow(t2')
```

```
error = norm(A - data50);
disp("The reconstruction error for 50 principal components is:")
```

```
The reconstruction error for 50 principal components is:
```

```
disp(error)
```

```
   42.3531
```

```
pc100 = v(:, 1:100);
data100 = A * (pc100 * pc100');

disp("10 principal components images 1 and 2:")
```

```
10 principal components images 1 and 2:
```

```
t1 = reshape(data100(1, :), 16, 16);
imshow(t1')
```

```
t2 = reshape(data100(2, :), 16, 16);
imshow(t2')
```

```
error = norm(A - data100);
disp("The reconstruction error for 100 principal components is:")
```

```
The reconstruction error for 100 principal components is:
```

```
disp(error)
```

```
   25.1730
```

```
pc200 = v(:, 1:200);
data200 = A * (pc200 * pc200');

disp("200 principal components images 1 and 2:")
```

```
200 principal components images 1 and 2:
```

```
t1 = reshape(data200(1, :), 16, 16);
imshow(t1')
```

```
t2 = reshape(data200(2, :), 16, 16);
imshow(t2')
```

```
error = norm(A - data200);
disp("The reconstruction error for 200 principal components is:")
```

The reconstruction error for 200 principal components is:

```
disp(error)
```

```
    8.1191
```

```
%A2 = reshape(exmp(2, :), 16, 16);
%imshow(A2')
```