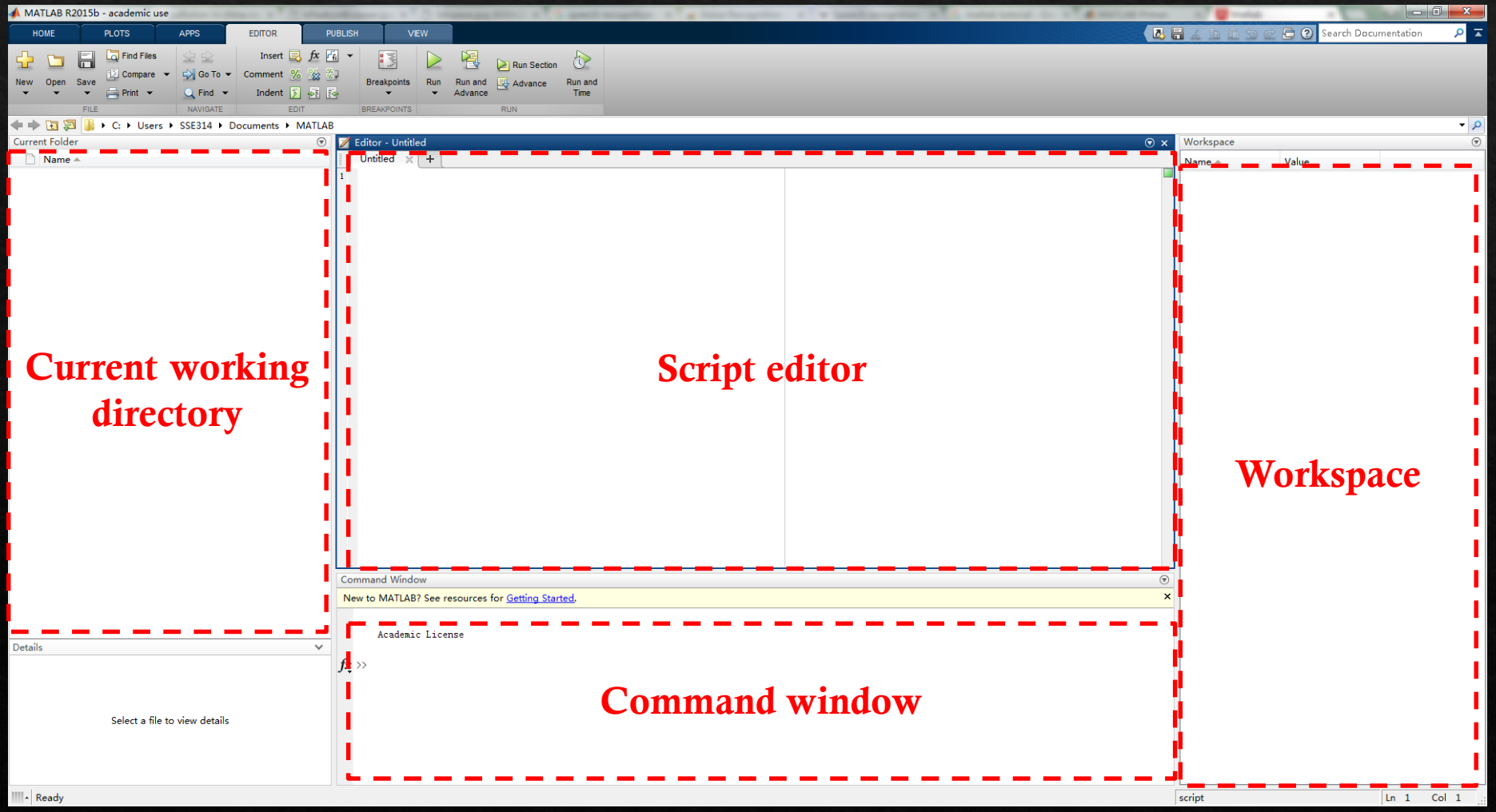
Matlab Tutorial

Development Environment



Commands

- Create a variable

```
a = 1
b = 2
c = a+b
d = cos(a)
sin(a)
e = a*b;
```

Character Strings

- Assign a string to a variable

```
myText = 'Hello, world'; % disp(myText);

otherText = 'You''re right' % disp(otherText);

f = 71;
c = (f-32)/1.8;
tempText = ['Temperature is ',num2str(c),'C'] % disp(tempText)
```

Calling Functions

- Functions

```
A = [1 3 5];
max(A)
```

Loops and Conditional Statements

- Within a script, you can loop over sections of code and conditionally execute sections using the keywords `for`, `while`, `if`, and `switch`

```
nsamples = 5;
npoints = 50;
for k = 1:nsamples
  currentData = rand(npoints,1); % create an array with
                                 % random values
  sampleMean(k) = mean(currentData); % mean value
end
overallMean = mean(sampleMean)
```

Matrices and Arrays

- Array Creation

```
a = [1 2 3 4]   % a row vector
a = [1 2 3; 4 5 6; 7 8 10]  % a square matrix
z = zeros(5,1)  % a column vector containing 5 zeros
```

- Matrix and Array Operations

```
a + 10
sin(a)
a'
p = a*inv(a)
p = a.*a
```

Matrices and Arrays

- Concatenation

```
A = [a, a]
```

```
A = [a; a]
```

- Array indexing

```
A = magic(4) % a 4*4 magic square
```

```
A(4,2)
```

```
A(8)
```

```
A(4,2) = 17
```

```
A(3,:)
```

$$A = \begin{bmatrix} 16 & 2 & 3 & 13 \\ 5 & 11 & 10 & 8 \\ 9 & 7 & 6 & 12 \\ 4 & 14 & 15 & 1 \end{bmatrix}$$

Matrices and Arrays

- Deleting Rows and Columns

```
A(:, 2) = [] % A is a 4*3 matrix
```

$$A = \begin{bmatrix} 16 & 3 & 13 \\ 5 & 10 & 8 \\ 9 & 6 & 12 \\ 4 & 15 & 1 \end{bmatrix}$$

Draw Lines

- Draw a line

```
x = 0:pi/100:2*pi;
y = sin(x);
figure % opens new figure window
plot(x,y)
```

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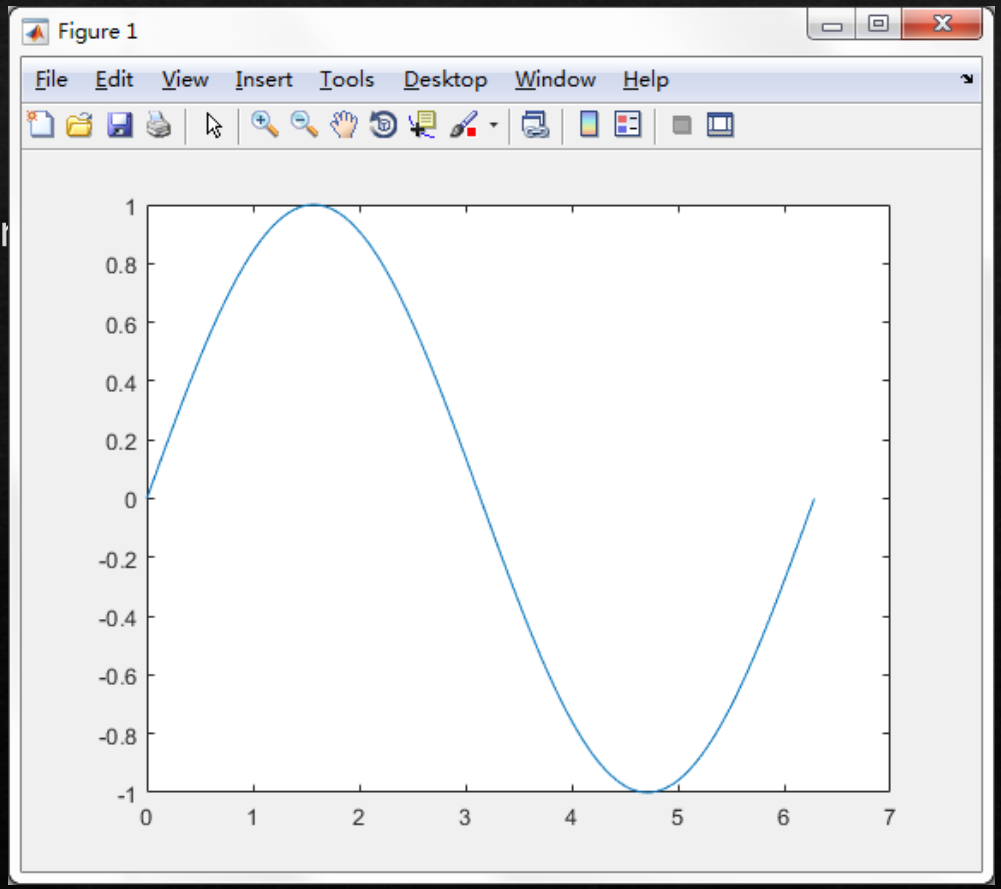
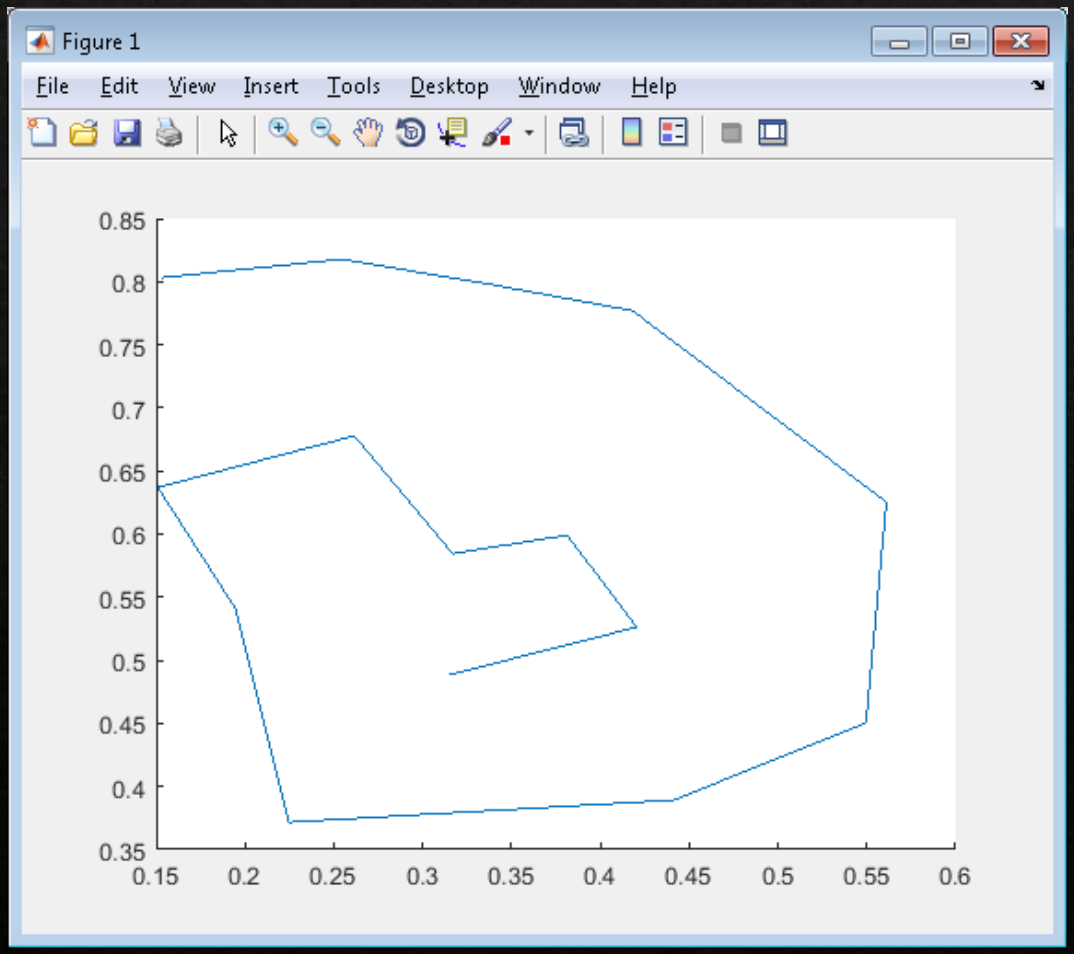


Draw Lines

- Draw a line

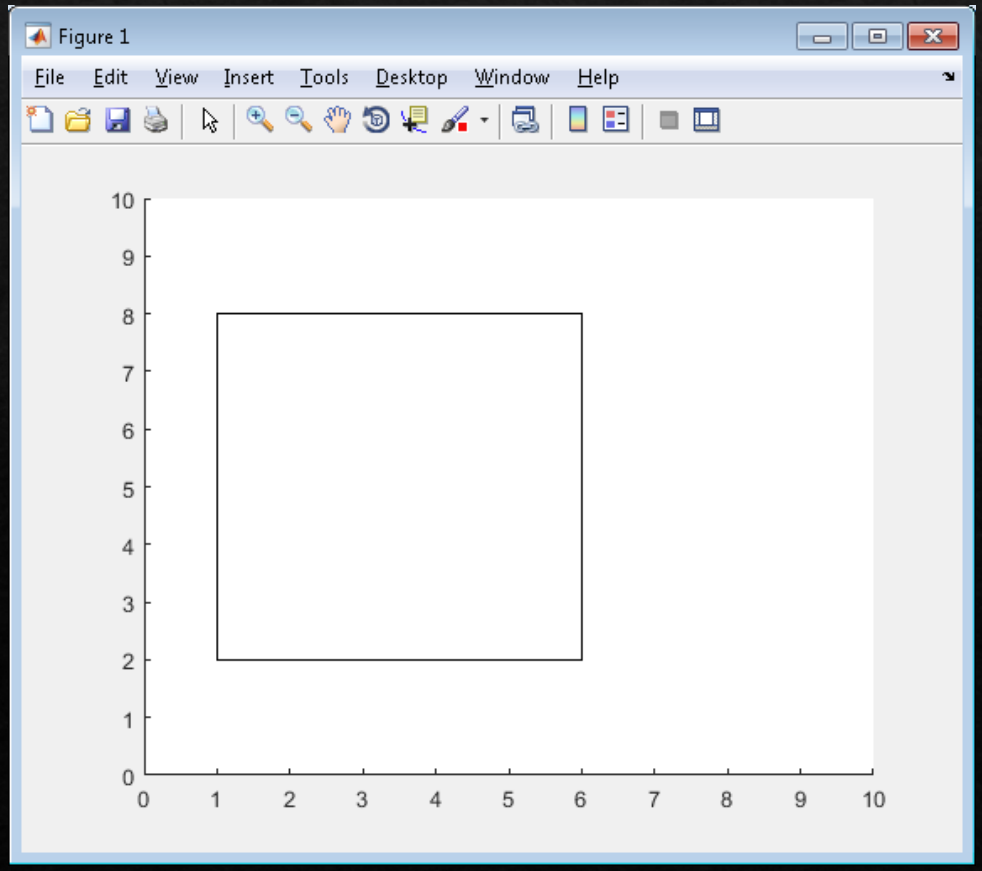
```
figure;
[x, y] = getline;
line(x,y);
% press Enter
```



Draw A Rectangle

- Rectangle('position', pos)

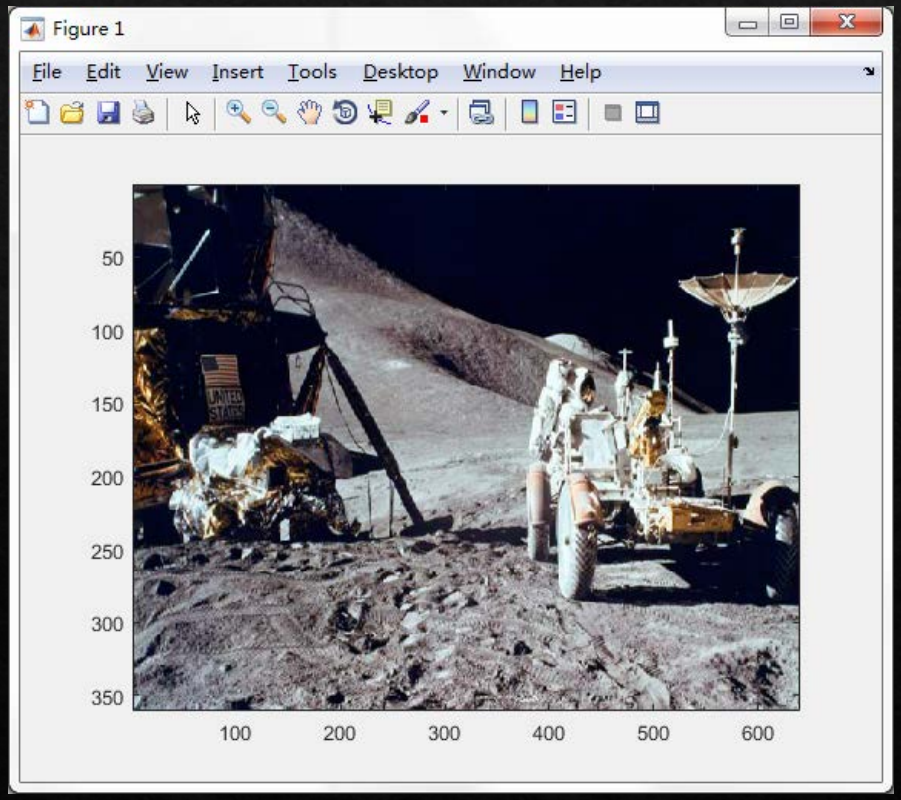
```
rectangle('Position',[1 2 5 6])
axis([0 10 0 10])
```



Load An Image

- Example

```
A = imread('moonwalk.jpg');
image(A);
```



Load Images

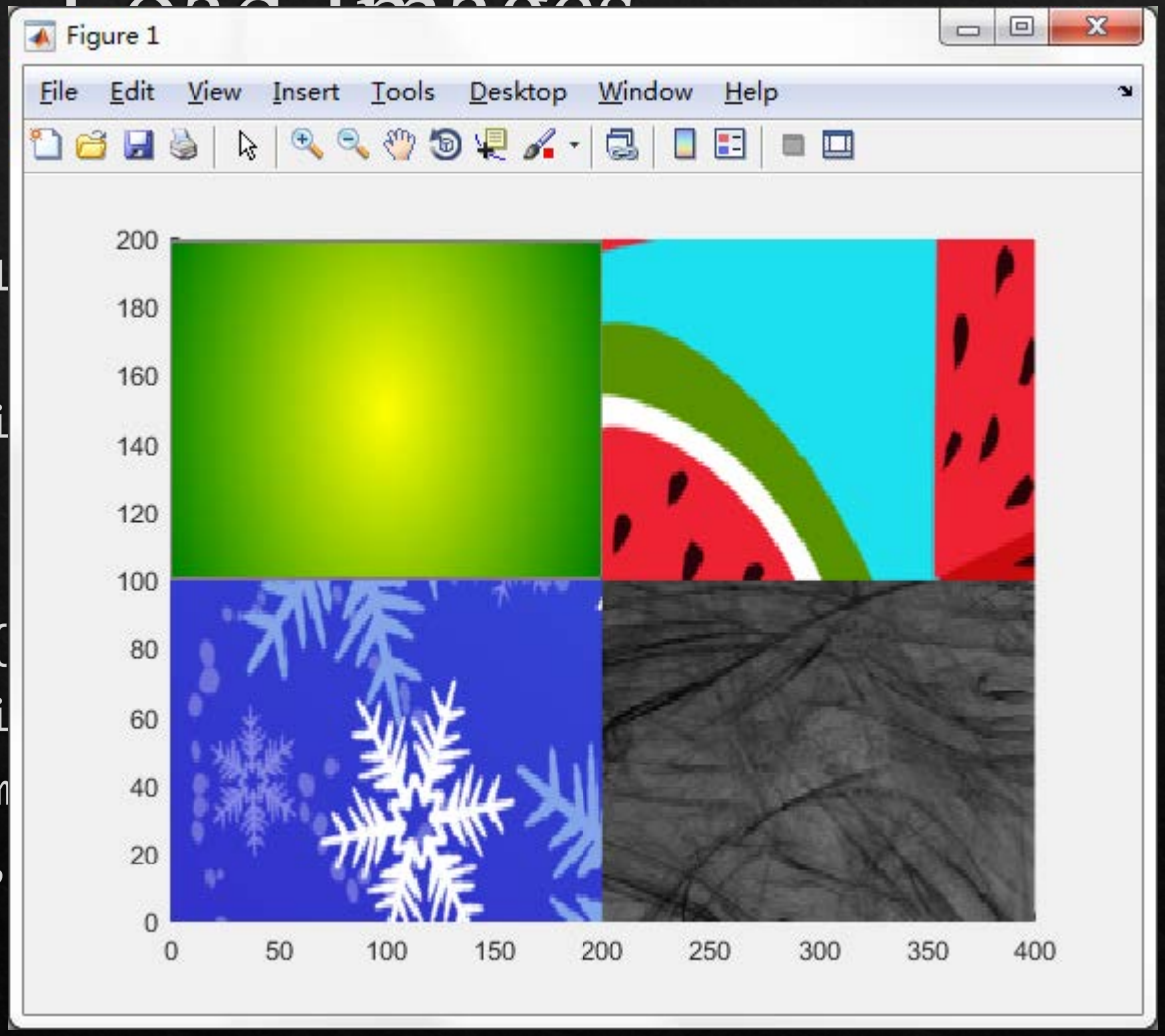
- Example

```
img = cell(4,1);
for i = 1:4
    img{i} = imread(['bg' num2str(i) '.png']);
end
hold on;  % draw images in the same figure
image(0,0,img{1});
image(200,0, img{2});
image(0,100,img{3});
image(200,100,img{4});
```

Load Images

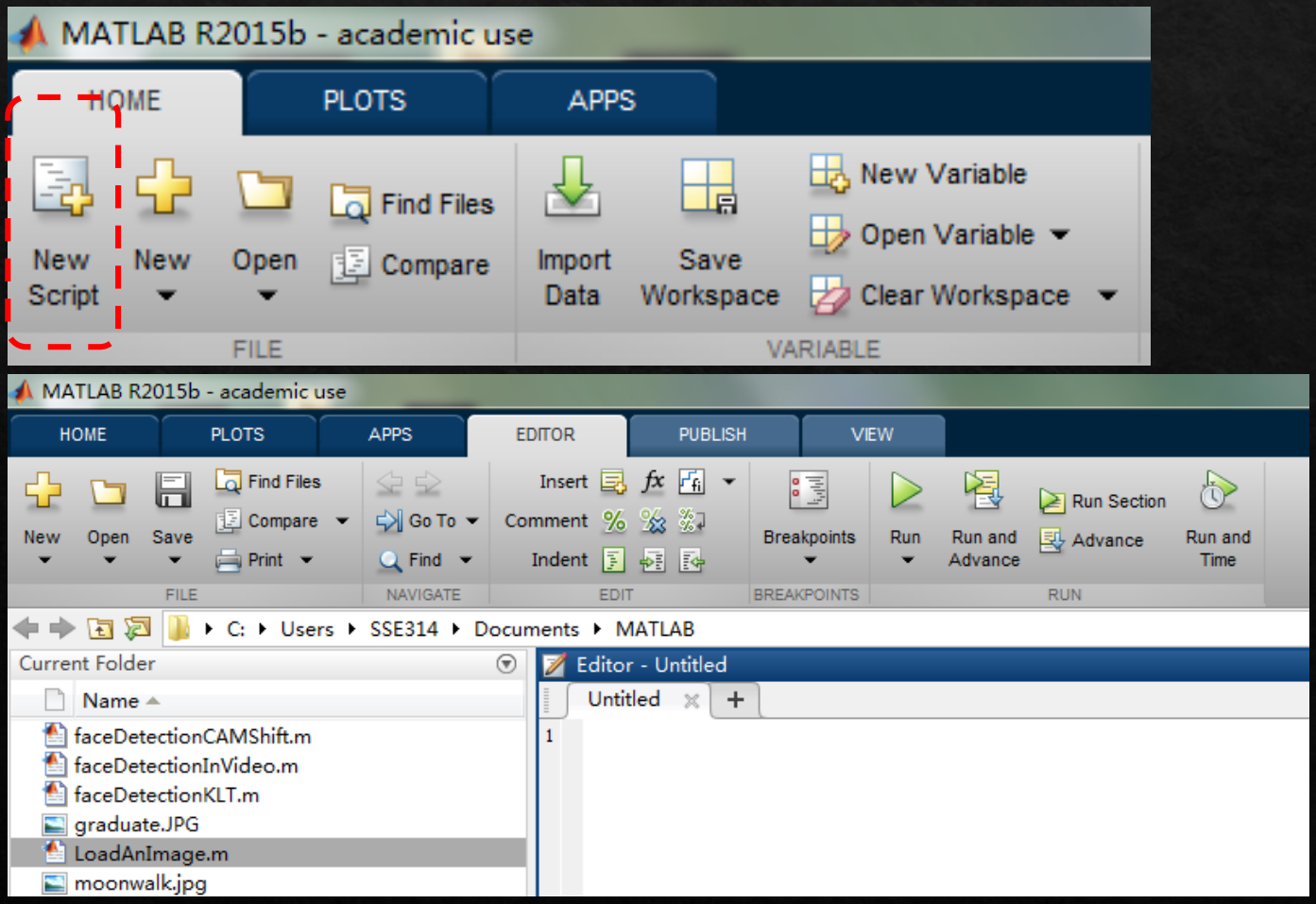
- Example

```
img = cell(4,1
for i = 1:4
    img{i} = i
end
hold on;
image(0,0,img{
image(200,0, i
image(0,100,im
image(200,100,
```



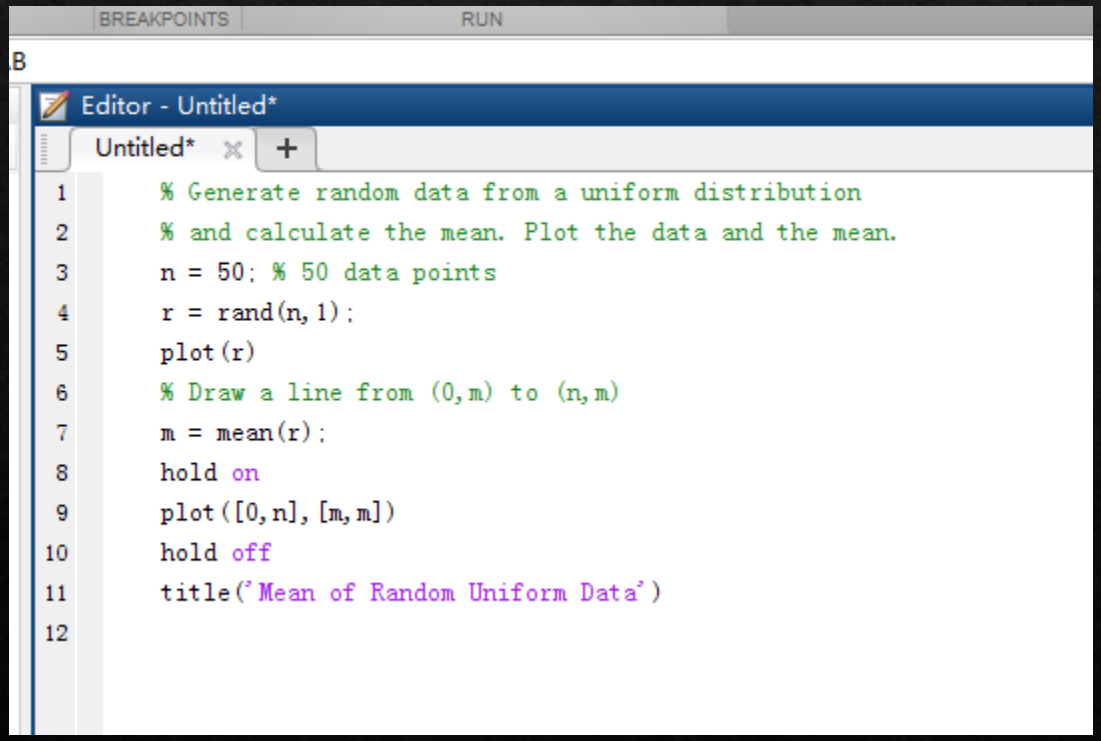
Programming and Scripts

- Create a new script



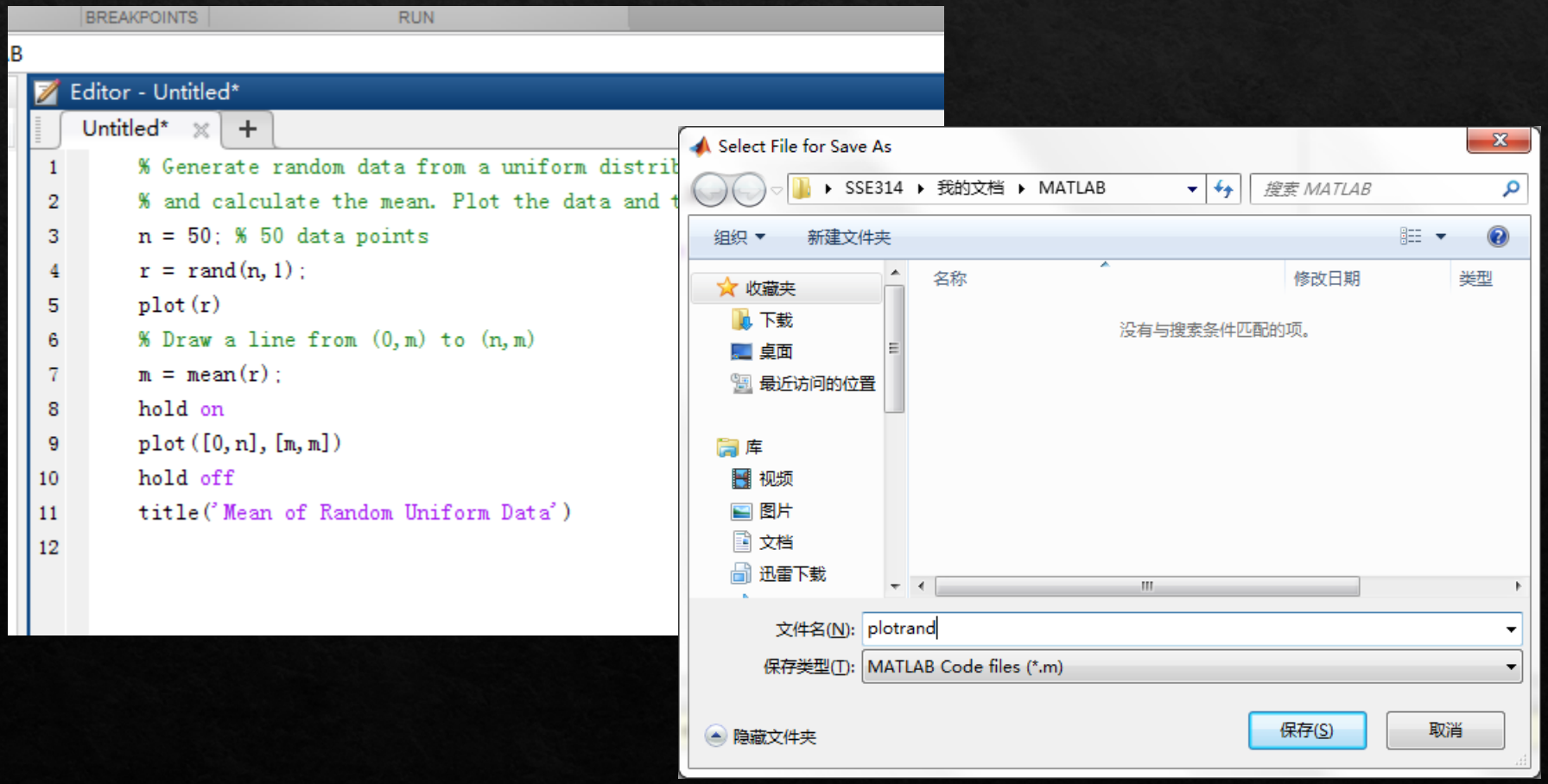
Programming and Scripts

- A sample script



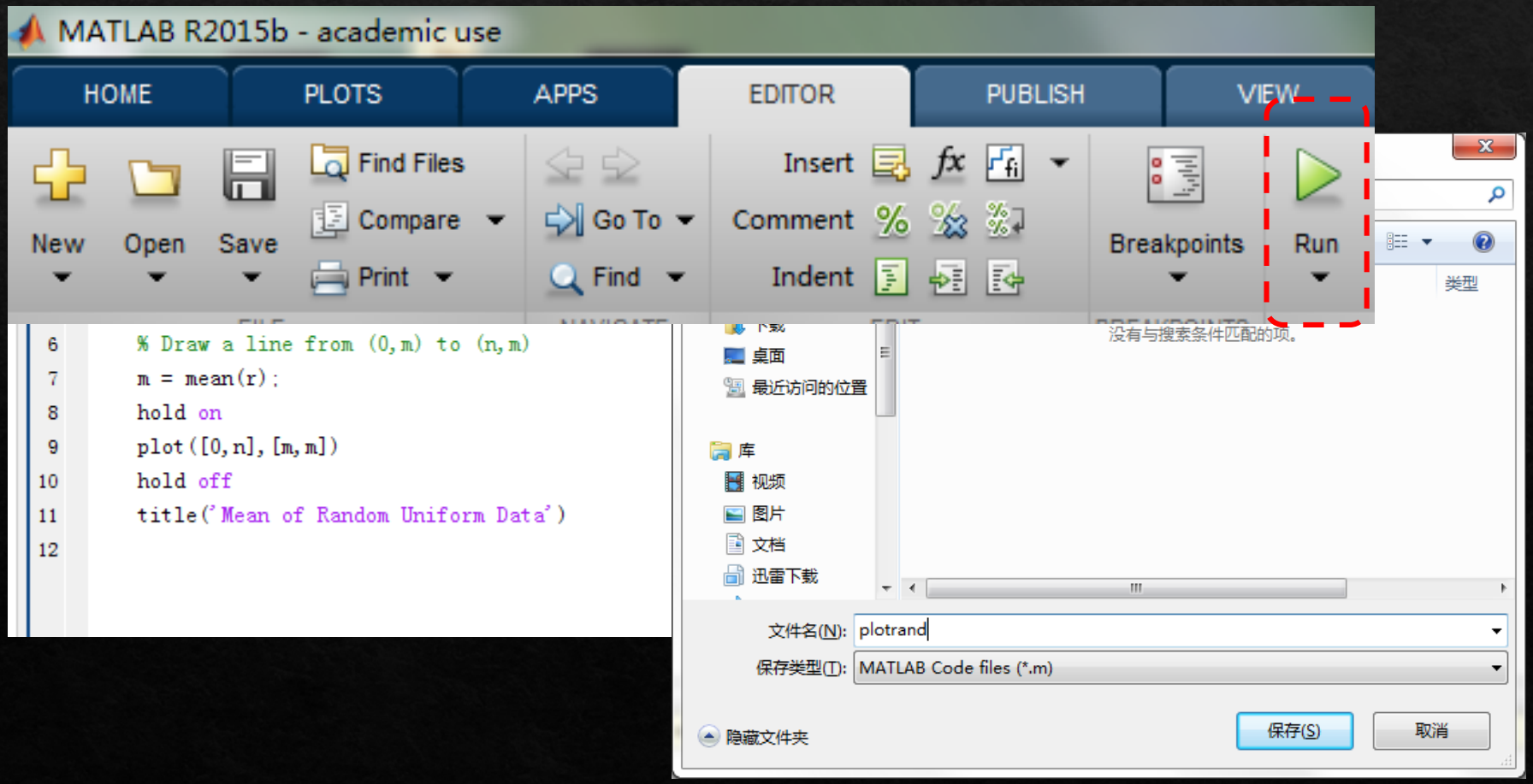
Programming and Scripts

- Save the script



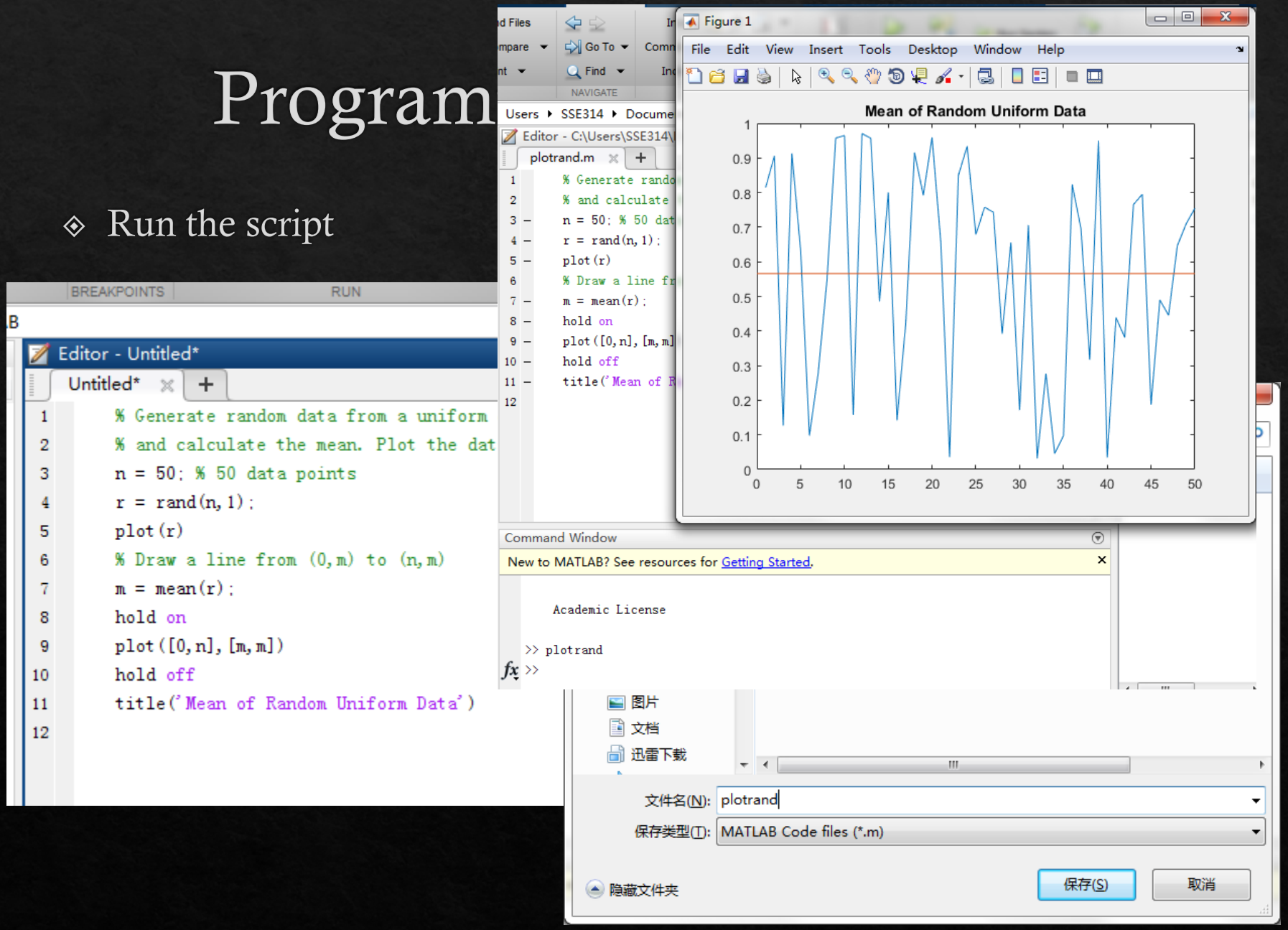
Programming and Scripts

- Run the script



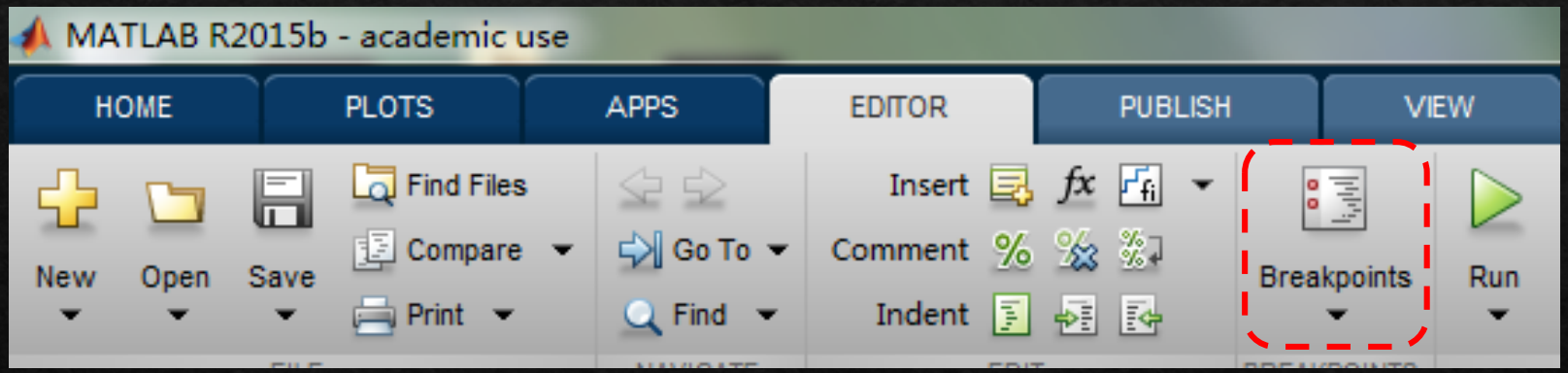
Program

- Run the script



Programming and Scripts

- Set a breakpoint



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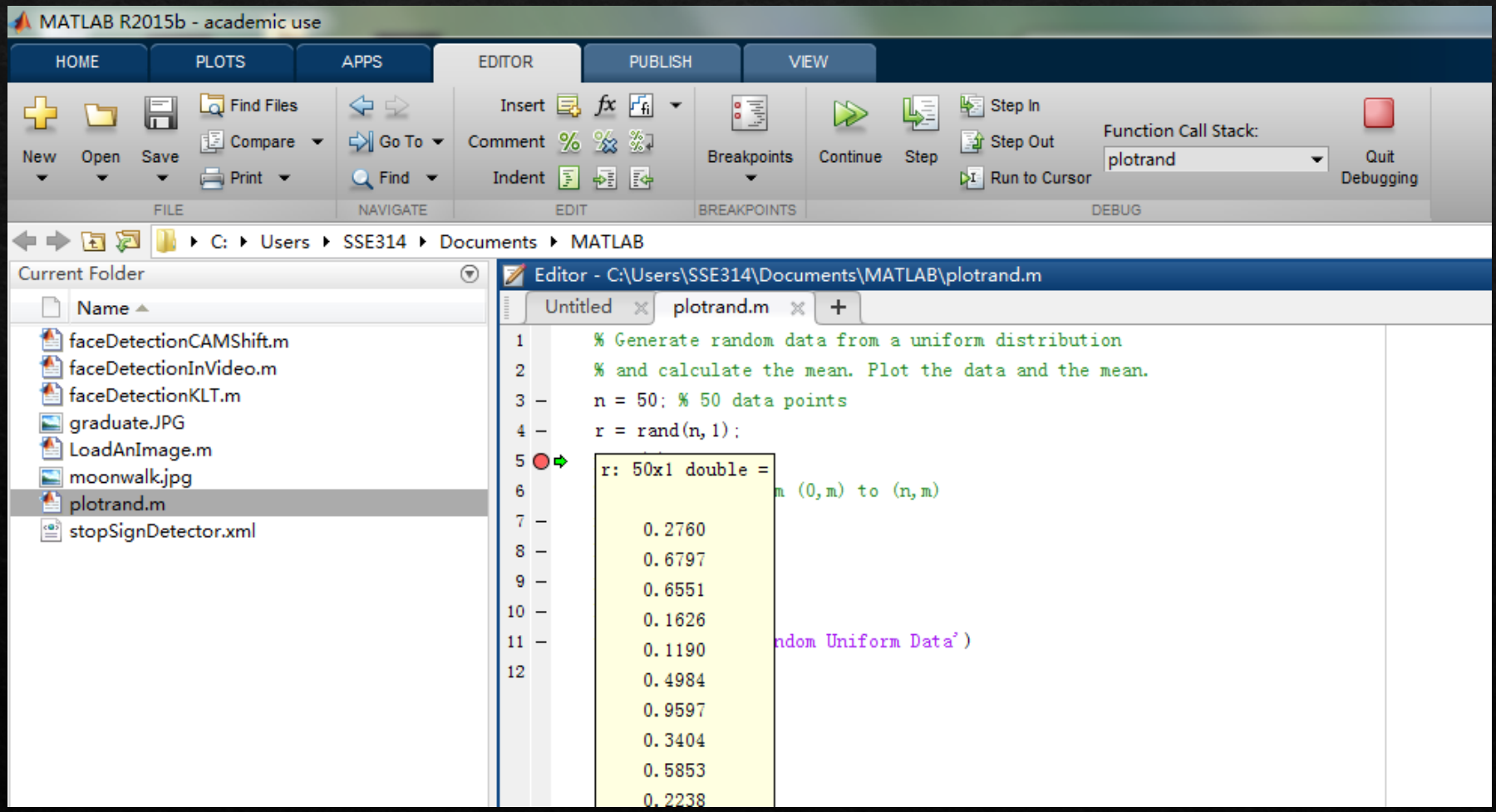

Programming a s

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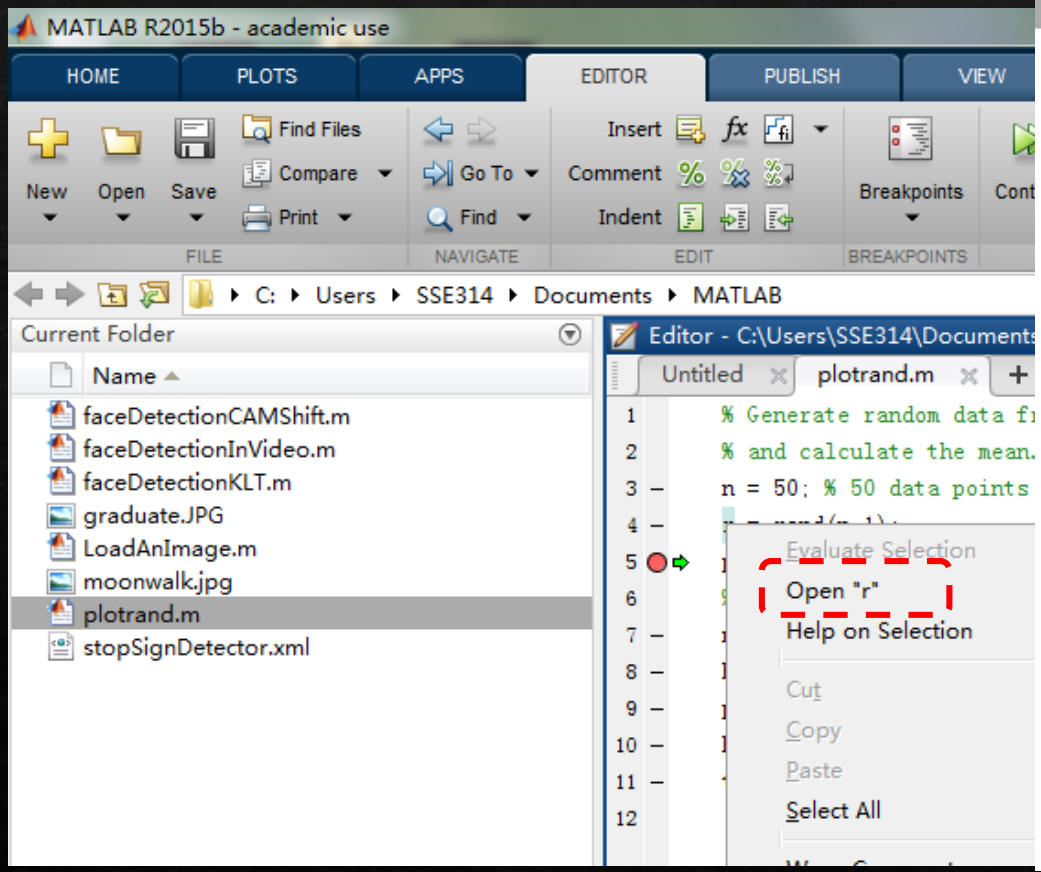

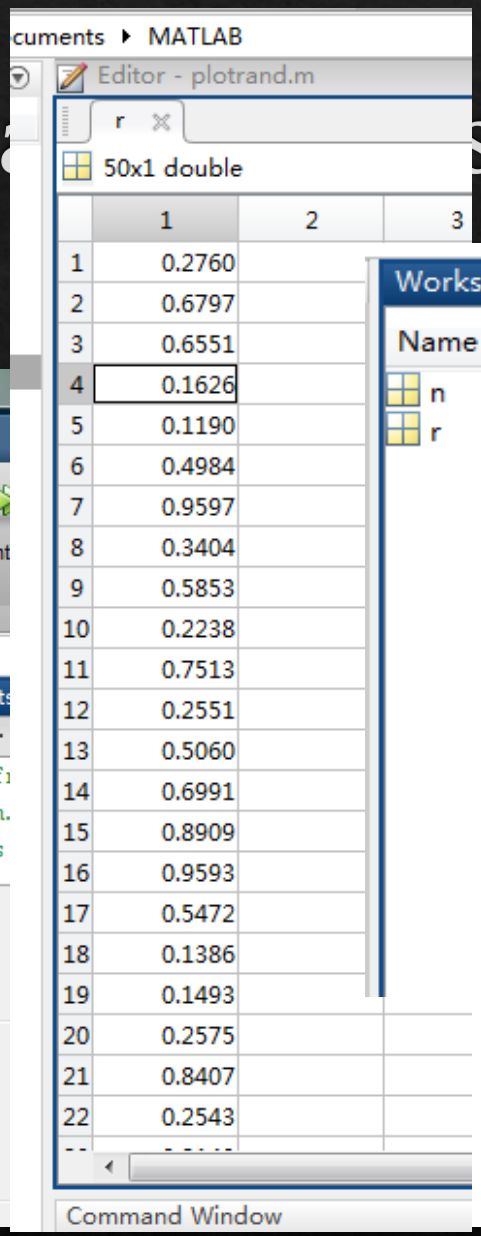

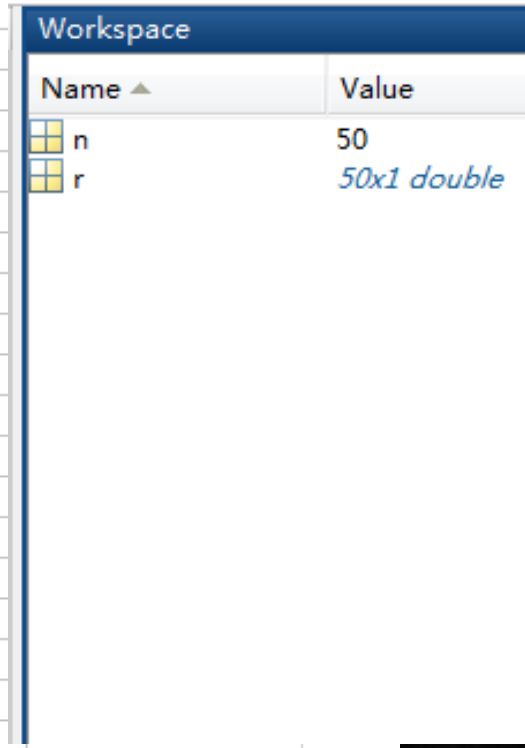

Exercise

1. Run previous examples
2. Finish the following tasks:

Task 1:

- Draw an oval; (x=acos(θ) y=bsin(θ))

Task 2:

- Load a series of images;
- Display one image each time and change to the next image when the right mouse button is clicked;
- Mark out all the faces in different images by dragging rectangles;
  - hint: getrect; strcmp(get(gcf,'SelectionType'),'alt')