**Jan 29, 2020 Interative Matlab Bsic Operation 2**

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**Ref:** Essential Matlab for Engineers and Scientists

- How to handline *.m function inline, out of interactive note , and inside interactive note
- If we want to use a function commend inside of interactive note, using in with inline method or put it in the end of incerative note (recommend to save out of interative as a *.m, because the note cannot break down in in.

### Inline Function

```
h = inline('cos(8*x) + cos(9*x)')
```

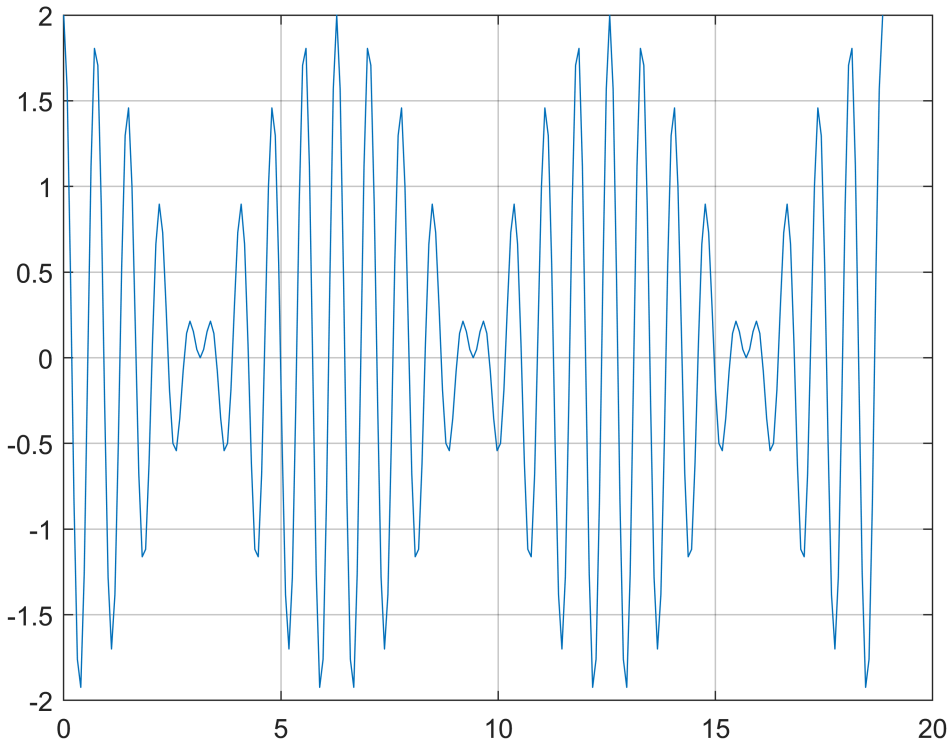
```
h =

     Inline function:
     h(x) = cos(8*x) + cos(9*x)
```

```
x = 0: pi/40 : 6*pi
```

```
x = 1×241
         0    0.0785    0.1571    0.2356    0.3142    0.3927    0.4712    0.5498 ···
```

```
plot(x, h(x)), grid
```




```
f = inline('x.^2 + y.^2','x','y');
```

```
f(1,2)
```

```
ans = 5
```

### Matrix Operation

```
a = [1 2; 3 4];
b = [5 6; 7 8];
```

```
c = a*b
```

```
c = 2×2
    19    22
    43    50
```

```
d = a.*b % element wise manipulation
```

```
d = 2×2
     5    12
    21    32
```

```
a^2
```

```
ans = 2×2
     7    10
    15    22
```

```
disp('determinat')
```

```
determinat
```

```
det(a)
```

```
ans = -2
```

```
disp('eigenvalue decomposition')
```

```
eigenvalue decomposition
```

```
eig(a)
```

```
ans = 2×1
   -0.3723
    5.3723
```

```
disp('inverse')
```

```
inverse
```

```
inv(a)
```

```
ans = 2×2
   -2.0000    1.0000
    1.5000   -0.5000
```

```
disp('LU factorization')
```

```
LU factorization
```

```
lu(a)
```

```
ans = 2×2
    3.0000    4.0000
    0.3333    0.6667
```

```
disp('orthogonal factorization')
```

```
orthogonal factorization
```

```
qr(a)
```

```
ans = 2×2
   -3.1623   -4.4272
    0.7208   -0.6325
```

```
disp('singular value decomposition')
```

```
singular value decomposition
```

```
svd(a)
```

```
ans = 2×1
    5.4650
    0.3660
```

```
disp('null space')
```

```
null space
```

```
A=[1 1 2;
    2 1 3;
    3 1 4;
    4 1 5;]
```

```
A = 4×3
     1     1     2
     2     1     3
     3     1     4
     4     1     5
```

```
nu=null(A) % Null space
```

```
nu = 3×1
    0.5774
    0.5774
   -0.5774
```

### While Loop

```
matnum = floor(10*rand + 1)
```

```
matnum = 10
fn2 =

     Inline function:
     fn2(x) = x^3 + x -3
dfn2 =

     Inline function:
     dfn2(x) = 3*x^2+1
```

```
steps =0;
re = 1e-8;
myrel =1;
x = input('Initial guess:'); % input turn out in command line , not in this notebook
disp(x)
```

```
    10
```

```
% need to call x input
while myrel > re & (steps <20)
    xold = x
    x = x - f(x)/df(x); % function in out of interactive cell as .m files
    steps = steps +1;
    disp([x fn(x)])
    myrel = abs((x-xold)/x)
end
% need to run x inputend
```

```
xold = 10
    6.6545  298.3295
myrel = 0.5027
xold = 6.6545
    4.4256   88.1047
myrel = 0.5036
xold = 4.4256
    2.9512   25.6556
myrel = 0.4996
xold = 2.9512
    2.0055    7.0722
myrel = 0.4715
xold = 2.0055
    1.4643    1.6040
myrel = 0.3696
xold = 1.4643
    1.2485    0.1945
myrel = 0.1729
xold = 1.2485
    1.2142    0.0044
myrel = 0.0282
xold = 1.2142
    1.2134    0.0000
myrel = 6.6248e-04
xold = 1.2134
    1.2134    0.0000
myrel = 3.5802e-07
xold = 1.2134
    1.2134   -0.0000
myrel = 1.0449e-13
```

```
% need to call x input
while myrel > re & (steps <20)
    xold = x
    x = x - fn(x)/dfn(x); % function in the end
    steps = steps +1;
    disp([x fn(x)])
    myrel = abs((x-xold)/x)
end
```

```
xold = 10
    6.6545  298.3295
myrel = 0.5027
xold = 6.6545
    4.4256   88.1047
myrel = 0.5036
xold = 4.4256
    2.9512   25.6556
myrel = 0.4996
```

```
xold = 2.9512
    2.0055    7.0722
myrel = 0.4715
xold = 2.0055
    1.4643    1.6040
myrel = 0.3696
xold = 1.4643
    1.2485    0.1945
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    1.2142    0.0044
myrel = 0.0282
xold = 1.2142
    1.2134    0.0000
myrel = 6.6248e-04
xold = 1.2134
    1.2134    0.0000
myrel = 3.5802e-07
xold = 1.2134
    1.2134   -0.0000
myrel = 1.0449e-13
```

```
fn2 = inline('x^3 + x -3')
```

```
fn2 =

     Inline function:
     fn2(x) = x^3 + x -3
```

```
dfn2 = inline('3*x^2+1')
```

```
dfn2 =

     Inline function:
     dfn2(x) = 3*x^2+1
```

```
% need to run x input
while myrel > re & (steps <20)
    xold = x
    x = x - fn2(x)/dfn2(x); % function inline
    steps = steps +1;
    disp([x fn(x)])
    myrel = abs((x-xold)/x)
end
```

```
xold = 10
    6.6545  298.3295
myrel = 0.5027
xold = 6.6545
    4.4256   88.1047
myrel = 0.5036
xold = 4.4256
    2.9512   25.6556
myrel = 0.4996
xold = 2.9512
    2.0055    7.0722
myrel = 0.4715
xold = 2.0055
    1.4643    1.6040
myrel = 0.3696
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```
xold = 1.4643
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xold = 1.2134
    1.2134    0.0000
myrel = 3.5802e-07
xold = 1.2134
    1.2134   -0.0000
myrel = 1.0449e-13
```

```
if myrel <= re
    disp('zero found at')
    disp(x)
else
    disp('zero not found')
end;
```

```
zero found at
    1.2134
```

```
f(10) % call from f.m
```

```
ans = 1007
```

```
df(10) % call from df.m
```

```
ans = 301
```