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5，1

```
x=1; while (x+x>x), x=x/2; end
%运行前是1，运行后是0

x=1; while (x+x>x), x=2*x; end
%运行前是1，运行后是inf
```

5.2

```
format long
Sum=0;
x=31*pi/2;
i=1;
while abs((-1)^(i-1)*x^(2*i-1)/factorial(2*i-1))>10e-16
    Sum=Sum+(-1)^(i-1)*x^(2*i-1)/factorial(2*i-1);
    i=i+1;
end
disp('误差：')
```

误差：

```
disp(Sum-sin(x));
```

```
     3.420943942999069e+04
```

```

Sum=0;
x=pi/2;
i=1;
while abs((-1)^(i-1)*x^(2*i-1)/factorial(2*i-1))>10e-16
    Sum=Sum+(-1)^(i-1)*x^(2*i-1)/factorial(2*i-1);
    i=i+1;
end
disp('误差：')
```

误差：

```
disp(Sum-sin(x));
```

```
     0
```

```

%出现上述原因是因为31*pi/2数很大，收敛速度很慢
```

5.3

```
% target = 4;
% guess = 0;
% while guess ~= target
%     guess = input('猜一个数（1-100）：');
%     if guess < target
%         disp('太低了');
%     elseif guess > target
%         disp('太高了');
%     else
%         disp('恭喜你，猜对了！');
%     end
% end
```

5.4

```
primeNumbers = [];
number = 2;
while number <= 100
    isPrime = true;
    for i = 2:sqrt(number)
        if mod(number, i) == 0
            isPrime = false;
            break;
        end
    end
    if isPrime
        primeNumbers = [primeNumbers, number];
    end
    number = number + 1;
end
disp('1到100间的所有素数为：');
```

1到100间的所有素数为：

```
disp(primeNumbers');
```

```
     2
     3
     5
     7
    11
    13
    17
    19
    23
    29
    31
    37
    41
    43
    47
    53
    59
    61
    67
    71
    73
    79
```

5.5

```
maxNumber=110;
primeNumbers = [];
number = 2;
maxPrime=0;
while number <= maxNumber
    isPrime = true;
    for i = 2:sqrt(number)
        if mod(number, i) == 0
            isPrime = false;
            break;
        end
    end
    if isPrime
        primeNumbers = [primeNumbers, number];
        if  number>=maxPrime
            maxPrime=number;
        end
    end
    number = number + 1;
end
disp('最大素数为：');
```

最大素数为：

```
disp(maxPrime);
```

```
    109
```

5.6

```
% score = input('请输入成绩(百分制):');
%
% if score >= 90 && score <= 100
%     grade = 'A';
% elseif score >= 80 && score < 90
%     grade = 'B';
% elseif score >= 70 && score < 80
%     grade = 'C';
% elseif score >= 60 && score < 70
%     grade = 'D';
% elseif score >= 0 && score < 60
%     grade = 'E';
% else
%     grade = '无效成绩';
% end
%
% fprintf('对应的等级是: %s\n', grade);
%
% grade = input('请输入成绩等级(A, B, C, D, E):', 's');
%
% switch grade
%     case 'A'
%         scoreRange = '90--100';
%     case 'B'
%         scoreRange = '80--89';
%     case 'C'
%         scoreRange = '70--79';
%     case 'D'
%         scoreRange = '60--69';
%     case 'E'
%         scoreRange = '0--59';
%     otherwise
%         scoreRange = '无效等级';
% end
%
% fprintf('对应的分数区间是: %s\n', scoreRange);
```

6.1

```
p = [6 0  -5 1 0];
q = [0 6  0 0 -1];

% 计算 p(x) + q(x)
sumPQ = p+q;

% 计算 p(x) * q(x)
productPQ = conv(p, q);

% 计算 p(x) 的导数
dp = polyder(p);

% 计算 q(x) 的导数
dq = polyder(q);

% 显示结果
disp('p(x) + q(x) = ');
```

```
p(x) + q(x) =
```

```
disp(poly2sym (sumPQ));
```

$$6x^4 + 6x^3 - 5x^2 + x - 1$$

```
disp('p(x) * q(x) = ');
```

```
p(x) * q(x) =
```

```
disp(poly2sym (productPQ));
```

$$36x^7 - 30x^5 + 5x^2 - x$$

```
disp('p''(x) = ');
```

```
p'(x) =
```

```
disp(poly2sym (dp));
```

$$24x^3 - 10x + 1$$

```
disp('q''(x) = ');
```

```
q'(x) =
```

```
disp(poly2sym (dq));
```

$$18x^2$$

6.2

```
p = [816 -3835 6000 -3125];

% 求出 p(x) 的所有零点
rootsP = roots(p);

% 显示所有零点
disp('p(x) 的所有零点为：');
```

```
p(x) 的所有零点为：
```

```
disp(rootsP);
```

```
   1.666666666666684
   1.562499999999985
   1.470588235294116
```

```
p=@(x)816*x^3-3835*x^2+6000*x-3125
```

```
p = 包含以下值的 function_handle:
    @(x)816*x^3-3835*x^2+6000*x-3125
```

```
% 用 fzero 计算 p(x) 的第二大零点
secondLargestRoot = fzero(p, [max(rootsP)/2 min(rootsP)]);
disp('p(x) 的第二大零点为：');
```

```
p(x) 的第二大零点为：
```

```
disp(secondLargestRoot);
```

```
   1.470588235294116
```

```

```

6.3

```
syms x y;
[solx,soly]=solve(x^2+y^2-4,x^2-y^2-1,x,y);
disp(solx);
```

$$\begin{pmatrix} -\frac{\sqrt{10}}{2} \\ \frac{\sqrt{10}}{2} \\ -\frac{\sqrt{10}}{2} \\ \frac{\sqrt{10}}{2} \end{pmatrix}$$

```
disp(soly);
```

$$\begin{pmatrix} -\frac{\sqrt{6}}{2} \\ -\frac{\sqrt{6}}{2} \\ \frac{\sqrt{6}}{2} \\ \frac{\sqrt{6}}{2} \end{pmatrix}$$

6.4

```
T{1}=[1];
T{2}=[1 0];
T{3}=conv(T{2}, [2,0])-[0,0,T{1}]
```

```
T = 1×21 cell
```

	1	2	3	4	5	6	7
1	1	[1,0]	[2,0,-1]	[4,0,-3,0]	[8,0,-8,0,1]	[16,0,-20,0,5,0]	[32,0,-4

```
for i=4:21
    T{i}=conv(T{i-1}, [2,0])-[0,0,T{i-2}];
end

disp(T{21})
```

```
      524288           0    -2621440           0     5570560           0    -6553600           0
```

6.5

```
vectcor1=[1 2 3];
vectorSize1=size(vectcor1,2);
verctor2=[1 2 3 4 5];
vectorSize2=size(verctor2,2);
if vectorSize1>vectorSize2
    i=0;
    while i<vectorSize1-vectorSize2
        verctor2=[0 verctor2];
        i=i+1;
    end
end
if vectorSize1<vectorSize2
    i=0;
    while i<vectorSize2-vectorSize1
        vectcor1=[0 vectcor1];
        i=i+1;
    end
end
disp(vectcor1);
```

```
     0     0     1     2     3
```

```
disp(verctor2);
```

```
     1     2     3     4     5
```