1) Generate a vector of the even numbers between 5 and 50.

2) Let \( x = [3\ 5\ 4\ 2\ 8\ 9] \).
   a) Add 20 to each element.
   b) Subtract 2 from each element.
   c) Add 3 to just the odd-index elements.
   d) Compute the square root of each element.
   e) Compute the square of each element.

3) Let \( x = [3\ 2\ 6\ 8] \) and \( y = [4\ 1\ 3\ 5] \)
   a) Add the sum of the elements in \( x \) to \( y \).
   b) Divide each element of \( y \) by the corresponding element in \( x \).
   c) Multiply each element in \( x \) by the corresponding element in \( y \).

4) Evaluate the following MATLAB expressions:
   a) \( 2 / 2 \ast 3 \)
   b) \( 6 - 2 / 5 + 7 ^ 2 - 1 \)
   c) \( 10 / 2 \backslash 5 - 3 + 2 \ast 4 \)
   d) \( 3 ^ 2 / 4 \)
   e) \( 3 \ast 2 ^ 2 \)
   f) \( 2 + \text{round}(6 / 9 + 3 \ast 2) / 2 - 3 \)
   g) \( 2 + \text{fix}(6 / 9 + 3 \ast 2) / 2 - 3 \)

5) Create a vector \( x \) with the elements:
   a) 2, 4, 6, 8.
   b) 10, 8, 6, 4, 2, 0, -2, -4.
   c) 1, 1/2, 1/3, 1/4, 1/5.
   d) 0, 1/2, 2/3, 3/4, 4/5.

6) Given a vector, \( t= 1:0.2:2 \), write down the MATLAB expressions that will correctly compute the following:
   a) \( \ln(2 + t + t^2) \)
   b) \( e^{[1 + \cos(3t)]} \)
   c) \( \cos^2(t) + \sin^2(t) \)
   d) \( \tan^{-1}(1) \)
   e) \( \cot(t) \)
   f) \( \sec^2(t) + \cot(t) – 1 \)

7) Plot the following functions over the interval \( 0 < x < 4 \) :
   a) \( x^3 \)
   b) \( e^x \)
   c) \( e^{x^2} \)

8) Given \( x = [3\ 1\ 5\ 7\ 9\ 2\ 6] \), evaluate the output of the following commands:
   a) \( x(3) \)
   b) \( x(1:7) \)
   c) \( x(1:end) \)
   d) \( x(1:end-1) \)
   e) \( x(6:-2:1) \)
   f) \( x([1\ 6\ 2\ 1\ 1]) \)
   g) \( \text{sum}(x) \)
9) Given the array \( A = [ 2 \ 4 \ 1 \ ; \ 6 \ 7 \ 2 \ ; \ 3 \ 5 \ 9 ] \), provide the commands needed to:
   a) Assign the first row of \( A \) to a vector called \( x_1 \).
   b) Assign the last 2 rows of \( A \) to an array called \( y \).
   c) Compute the sum over the columns of \( A \).
   d) Compute the sum over the rows of \( A \).

10) Given the arrays \( x = [ 1 \ 4 \ 8 ] \), \( y = [ 2 \ 1 \ 5 ] \) and \( A = [ 3 \ 1 \ 6 \ ; \ 5 \ 2 \ 7 ] \), determine which of the following statements will correctly execute and provide the result:
   a) \( x + y \)
   b) \( x + A \)
   c) \( x' + y \)
   d) \( A - [x' \ y'] \)
   e) \([x ; y'] \)
   f) \([x ; y] \)
   g) \( A - 3 \)

11) Given the array \( A = [ 2 \ 7 \ 9 \ 7 \ ; \ 3 \ 1 \ 5 \ 6 \ ; \ 8 \ 1 \ 2 \ 5 ] \), explain the results of the following commands:
   a) \( A' \)
   b) \( A(:,[1 \ 4]) \)
   c) \( A([2 \ 3],[3 \ 1]) \)
   d) \( A(:) \)
   e) \( [A(end,:)]) \)
   f) \( A(1:3,:) \)
   g) \( [A ; A(1:2,:)] \)
   h) \( \text{sum}(A) \)
   i) \( \text{sum}(A') \)
   j) \( \text{sum}(A,2) \)
   k) \([ [ A ; \text{sum}(A) ] [ \text{sum}(A,2) ; \text{sum}(A(:)) ] ] \)

12) Given the array \( A = [ 2 \ 7 \ 9 \ 7 \ ; \ 3 \ 1 \ 5 \ 6 \ ; \ 8 \ 1 \ 2 \ 5 ] \), provide the command that will:
   a) assign the even-numbered columns of \( A \) to an array called \( B \)
   b) assign the odd-numbered rows to an array called \( C \)
   c) convert \( A \) into a 4-by-3 array
   d) compute the reciprocal of each element of \( A \)
   e) compute the square-root of each element of \( A \)

13) Given that \( x = [ 1 \ 5 \ 2 \ 8 \ 9 \ 0 \ 1 ] \) and \( y = [ 5 \ 2 \ 2 \ 6 \ 0 \ 0 \ 2 ] \), find the results of the following commands:
   a) \( x > y \)
   b) \( y < x \)
   c) \( x == y \)
   d) \( x <= y \)
   e) \( y >= x \)
   f) \( x | y \)
   g) \( x & y \)
   h) \( x & (~y) \)
   i) \( (x > y) | (y < x) \)
   j) \( (x > y) & (y < x) \)
14) Given \( x = 1:10 \) and \( y = [3 1 5 6 8 2 9 4 7 0] \), find the results of the following commands:
   a) \((x > 3) \& (x < 8)\)
   b) \(x(x > 5)\)
   c) \(y(x <= 4)\)
   d) \(x( ~ (x < 2) \mid (x >= 8) ~)\)
   e) \(y( ~ (x < 2) \mid (x >= 8) ~)\)
   f) \(x(y < 0)\)

15) Write the MATLAB commands of \( \text{sign}(x) \) function with different name (like \textit{numbersign}(x)).

16) Write a script to evaluate the value of \( T \) according to the following conditions:

\[
T = \begin{cases} 
200 & \text{when } y \text{ is below } 10,000 \\
200 + 0.1(y - 10,000) & \text{when } y \text{ is between } 10,000 \text{ and } 20,000 \\
1,200 + 0.15(y - 20,000) & \text{when } y \text{ is between } 20,000 \text{ and } 50,000 \\
5,700 + 0.25(y - 50,000) & \text{when } y \text{ is above } 50,000
\end{cases}
\]

17) Given the vector \( x = [1 8 3 9 0 1] \), create a short set of commands that will:
   (using loop statements)
   a) Add up the values of the elements.
   b) Computes the sine of the given \( x \)-values.

18) Create an \( M \)-by-\( N \) array of random numbers. Move through the array, element by element, and set any value that is less than 0.2 to 0 and any value that is greater than (or equal to) 0.2 to 1.

19) Given \( x = [4 1 6] \) and \( y = [6 2 7] \), write the script to compute the following arrays:
   a) \( a_{ij} = x_i y_j \)
   b) \( b_{ij} = x_i/y_j \)
   c) \( c_i = x_i y_i \), then add up the elements of \( c \).
   d) \( d_{ij} = x_i/(2 + x_i + y_j) \)
   e) \( e_{ij} = \text{reciprocal of the lesser of } x_i \text{ and } y_j \)

20) Write a script that will use the random-number generator \textit{rand} to determine the following:
   a) The number of random numbers it takes to add up to 20 (or more).
   b) The number of random numbers it takes before a number between 0.8 and 0.85 occurs.
   c) The number of random numbers it takes before the mean of those number is greater than 0.5 .

21) Given \( x=[7 6 1 2 0 -1 4 3 -2 0] \) what are the commands that will execute the following operations:
   a) Sets the negative values of \( x \) to zero.
   b) Extract the values of \( x \) greater than 3 in a vector \( y \).
   c) Add 3 to the values of \( x \) that are even.
   d) Set the values of \( x \) that are less than the mean to zero.
   e) Set the values of \( x \) that is greater than the mean to their difference with the mean.
22) Write a script that will calculate the current in each branch of the following circuit:

![Circuit Diagram]

23) Write a script that will calculate $Z_T$ and $I_S$ of the following network:

![Network Diagram]

24) Write a script that will find the roots of $x$ for the polynomial

$2x^4 + 3x^3 - 10x^2 - 11x + 22$

25) Write down the commands for each of the following operations:
   a) Create a row vector $x$ of 5 equally spaced elements between 2 and 3.
   b) Add 1 to the second element.
   c) Create a second row vector $y$ of same dimension with elements equal to the successive even integers starting with 4.
   d) Create the matrix $A$, whose first row is equal to $x$, whose second row is a line of ones, and whose third row is equal to $y$.
   e) Define a row vector $z$, whose elements are equal to the mean value of the columns of $A$.
   f) Define a column vector $zz$, whose elements are the sum of the elements in each rows of $A$.

26) Create a vector $a$ with elements

$$a_n = \frac{(-1)^n \pi^{2n}}{(2n)!} \quad 1 \leq n \leq 100$$

(You can use the MATLAB function `factorial(n)` to compute $n!$).

27)
1) \( A = (6:2:50) \)

2) \( x = [3 \ 5 \ 4 \ 2 \ 8 \ 9] \)
   a) \( A = x + 20 \)
   b) \( A = x - 2 \)
   c) \( A = x(1:2:end) + 3 \)
   d) \( A = \sqrt{x} \)
   e) \( A = x.^2 \)

3) \( x = [3 \ 2 \ 6 \ 8], \ y = [4 \ 1 \ 3 \ 5] \)
   a) \( A = y + \text{sum}(x) \)
   b) \( A = x.^y \)
   c) \( A = y ./ x \)
   d) \( A = x .* y \)

4) \( \text{Ans} = \)
   a) 3
   b) 53.6000
   c) 6
   d) 2.2500
   e) 81
   f) 2.5000
   g) 2

5) \( \text{Ans} = \)
   a) \( x = [2:2:8] \)
   b) \( x = [10:-2:-4] \)
   c) \( A = [1:5], \ x = 1 ./ A \)
   d) \( A = [0:4], \ B = [1:5], \ x = A ./ B \)

6) \( t = 1:0.2:2 \)
   a) \( A = \log(2 + t + t.^2) \)
   b) \( A = \exp(t).* (1 + \cos(3*t)) \)
   c) \( A = \cos(t).^2 + \sin(t).^2 \)
   d) \( A = \tan(t) \)
   e) \( A = \cot(t) \)
   f) \( A = \sec(t).^2 + \cot(t) - 1 \)

7) \( x = 0:0.1:4 \)
   a) \( \text{plot}(x, x.^3) \)
   b) \( \text{plot}(x, \exp(x)) \)
   c) \( \text{plot}(x, \exp(x.^2)) \)

8) \( x = [3 \ 1 \ 5 \ 7 \ 9 \ 2 \ 6] \)
   a) 5
   b) 3 \ 1 \ 5 \ 7 \ 9 \ 2 \ 6
   c) 3 \ 1 \ 5 \ 7 \ 9 \ 2 \ 6
   d) 3 \ 1 \ 5 \ 7 \ 9 \ 2
   e) 2 \ 7 \ 1
   f) 3 \ 2 \ 1 \ 3 \ 3
   g) 33

9) \( A = [2 \ 4 \ 1 ; 6 \ 7 \ 2 ; 3 \ 5 \ 9] \)
   a) \( x1 = A(1,:) \)
   b) \( y = A(\text{end-1:end,:}) \)
c) c = sum(A)
d) d = sum(A,2)

10) x = [1 4 8], y = [2 1 5], A = [3 1 6; 5 2 7]
   a) 3 5 13
   b) Not correct.
   c) Not correct.
   d) Not correct.
   e) Not correct.
f)  1  4  8
    2  1  5
g)  0 -2  3
    2 -1  4

11) A = [2 7 9 7; 3 1 5 6; 8 1 2 5]
   a)  2  3  8
      7  1  1
      9  5  2
      7  6  5
   b)  2  7
      3  6
      8  5
c)  5  3
    2  8
d)  2
    3
    8
    7
    1
    1
    9
    5
    2
    7
    6
    5
e)  8  1  2  5
    2  7  9  7
    3  1  5  6
    8  1  2  5
f)  2  7  9  7
   3  1  5  6
   8  1  2  5
g)  3  1  5  6
    8  1  2  5
    2  7  9  7
    3  1  5  6
h) 13  9 16 18
i) 25 15 16
j) 25
   15
   16
k) 2  7  9  7  25
   3  1  5  6  15
   8  1  2  5  16
   13  9 16 18 56
12) \( A = \begin{bmatrix} 2 & 7 & 9 & 7; & 3 & 1 & 5 & 6; & 8 & 1 & 2 & 5 \end{bmatrix} \)
   a) \( B = A(:,2:2:end) \)
   b) \( C = A(1:2:end,:) \)
   c) \( c = A' \)
   d) \( d = 1./A \)
   e) \( e = \text{sqrt}(A) \)

13) \( x = [1 5 2 8 9 0 1] , y = [5 2 2 6 0 0 2] \)
   a) \( 0 1 0 1 1 0 0 \)
   b) \( 0 0 1 0 0 0 1 \)
   c) \( 0 1 0 0 0 0 1 \)
   d) \( 1 0 1 0 0 1 1 \)
   e) \( 1 1 1 1 0 1 1 \)
   f) \( 1 1 1 1 0 1 1 \)
   g) \( 1 1 1 1 0 1 1 \)
   h) \( 0 0 1 0 0 0 1 \)
   i) \( 0 1 0 1 0 0 0 \)
   j) \( 0 1 0 1 1 0 0 \)

14) \( x = 1:10 , y = [3 1 5 6 8 2 9 4 7 0] \)
   a) \( 0 0 0 1 1 1 1 0 0 0 \)
   b) \( 6 7 8 9 10 \)
   c) \( 3 1 5 6 \)
   d) \( 1 8 9 10 \)
   e) \( 3 4 7 0 \)
   f) \( \text{Empty matrix: 1-by-0} \)

15) The file saved as numbersign.m
   function \( f = \text{numbersign}(x) \)
   if \( x > 0 \)
     \( f = 1; \)
   elseif \( x == 0 \)
     \( f = 0; \)
   else
     \( f = -1; \)
   end

16) clc
clear
y=input('input the value of y =');
if \( y<10000 \)
    \( T=200; \)
elseif \( (y>=10000) \) \& \( (y<20000) \)
    \( T=200 + 0.1*(y - 10000) \)
elseif \( (y>=20000) \) \& \( (y<50000) \)
    \( T=1200 + 0.15*(y - 20000) \)
else
    \( T=5700 + 0.25*(y - 50000) \)
end
T
17) 
   a) clc
      clear
      x = [1 8 3 9 0 1];
      sum=0;
      for i=1:6
         sum=sum+x(i);
      end
      sum

   b) clc
      clear
      x = [1 8 3 9 0 1];
      sum=0;
      for i=1:6
         sine(i)=sin(x(i));
      end
      sine

18) 
   clc
   clear
   M=input('input the number of rows =');
   N=input('input the number of columns =');
   for i=1:M
      for j=1:N
         A(i,j)=rand;
      end
   end
   for i=1:M
      for j=1:N
         if A(i,j)<0.2
            A(i,j)=0;
         else
            A(i,j)=1;
         end
      end
   end
   A

19) 
   clc
   clear
   x = [4 1 6];y = [6 2 7];
   N = length(x);
   for j = 1:N
      c(j) = x(j)*y(j);
      for k = 1:N
         a(j,k) = x(j)*y(k);
         b(j,k) = x(j)/y(k);
         d(j,k) = x(j)/(2 + x(j) + y(k));
         e(j,k) = 1/min(x(j),y(k));
      end
   end
   c = sum(c);
20)  

a) 
```matlab
clc
clear
sum=0;count=0;
while sum < 20
    sum=sum+rand;
    count=count+1;
end
disp(['the number of random numbers =',int2str(count)])
```

b) 
```matlab
clc
clear
count=0;
while 1
    x=rand;
    if (x>0.8) & (x<0.85)
        break
    end
    count=count+1;
end
disp(['the number of random numbers =',int2str(count)])
```

c) 
```matlab
clc
clear
count=0;average=0;sum=0;
while average <= 0.5
    sum=sum+rand;
    count=count+1;
    average=sum/count;
end
disp(['the number of random numbers =',int2str(count)])
```

21)  

a) 
```matlab
x=[7 6 1 2 0 -1 4 3 -2 0];
n=length(x);
for i=1:n
    if x(i)<0
        x(i)=0;
    end
end
x
```

b) 
```matlab
x=[7 6 1 2 0 -1 4 3 -2 0];
n=length(x);ind=1;
for i=1:n
    if x(i)>3
        y(ind)=x(i);
        ind=ind+1;
    end
end
y
```
c) \[ x = \begin{bmatrix} 7 & 6 & 1 & 2 & 0 & -1 & 4 & 3 & -2 & 0 \end{bmatrix}; \]
\[ n = \text{length}(x); \]
\[ \text{for } i = 1:n \]
\[ \quad \text{if } \text{mod}(x(i),2) == 0 \]
\[ \quad \quad x(i) = x(i) + 3; \]
\[ \quad \text{end} \]
\[ \text{end} \]
\[ x \]

d) \[ x = \begin{bmatrix} 7 & 6 & 1 & 2 & 0 & -1 & 4 & 3 & -2 & 0 \end{bmatrix}; \]
\[ n = \text{length}(x); \]
\[ \text{for } i = 1:n \]
\[ \quad \text{if } x(i) < \text{mean}(x) \]
\[ \quad \quad x(i) = 0; \]
\[ \quad \text{end} \]
\[ \text{end} \]
\[ x \]
e) \[ x = \begin{bmatrix} 7 & 6 & 1 & 2 & 0 & -1 & 4 & 3 & -2 & 0 \end{bmatrix}; \]
\[ n = \text{length}(x); \]
\[ \text{for } i = 1:n \]
\[ \quad \text{if } x(i) > \text{mean}(x) \]
\[ \quad \quad x(i) = x(i) - \text{mean}(x); \]
\[ \quad \text{end} \]
\[ \text{end} \]
\[ x \]

22) By using mesh analysis
\[ 2I_1 - I_2 + 0 = -2 \]
\[ 6I_1 - I_1 - 3I_3 = 4 \]
\[ 7I_1 - 3I_2 + 0 = 2 \]
Rearrange the equations
\[ 2I_1 - I_2 + 0 = -2 \]
\[ -I_1 + 6I_2 - 3I_3 = 4 \]
\[ 0 - 3I_2 + 7I_3 = 2 \]
\[
\text{clc}
\text{clear}
\text{A} = \begin{bmatrix} 2 & -1 & 0 \; -1 & 6 & -3 \; 0 & -3 & 7 \end{bmatrix}; \text{B} = \begin{bmatrix} -2 \; 4 \; 2 \end{bmatrix};
\text{I} = \text{A} \backslash \text{B};
\text{I1} = \text{I}(1);
\text{I2} = \text{I}(2);
\text{I3} = \text{I}(3)\]

23) \[
\text{clc}
\text{clear}
\text{Xl} = 8; \text{R} = 5; \text{Xc} = 12; \text{e} = 20 \times \text{exp}(i \times (20 \times \text{pi}/180));
\text{Z1} = \text{complex}(0, \text{Xl});
\text{Z2} = \text{complex}(\text{R}, -\text{Xc});
\text{Zt} = \text{Z1} \times \text{Z2} / (\text{Z1} + \text{Z2})
\text{Is} = \text{e} / \text{Zt} \]
24) 
```matlab
clc
clear
p = [1, 2, -13, -14, 24];
x = roots(p)
```

25) 
- a) `x=[2:1/4:3]`
- b) `x(2)=x(2)+1`
- c) `y=[4:2:12]`
- d) `A=[x; ones(1,5); y]`
- e) `z=mean(A)`
- f) `zz=sum(A,2)`

26) 
```matlab
clc
clear
for n=1:100
    a(n)=(-1)^n*pi^(2*n)/factorial(2*n);
end
```