Independent Work 01.

Question 01.

Create a matrix.

```
disp("Question 01.") ;
```

```
Question 01.
```

```
a_matrix = [ 3 7 -8 9 3 4 ; ...
    1 6 -9 -5 4 2 ; ...
    -7 6 1 0 9 3 ; ...
    5 -7 -1 2 1 0 ; ...
    6 -9 4 7 0 -3 ] ;
a_matrix
```

```
a_matrix = 5×6
     3     7    -8     9     3     4
     1     6    -9    -5     4     2
    -7     6     1     0     9     3
     5    -7    -1     2     1     0
     6    -9     4     7     0    -3
```

(1) Show the element which is in the second row and the third column.

```
a_element = a_matrix(2,3) ;
a_element
```

```
a_element = -9
```

(2) Show the elements from the fourth row.

```
a_row = a_matrix(4,:) ;
a_row
```

```
a_row = 1×6
     5    -7    -1     2     1     0
```

Question 02.

Create the matrices. (A/B/C/D)

```
disp("Question 02.") ;
```

```
Question 02.
```

```
A = [ 2 3 -1 ; ...
    2 0 1 ] ;
A
```

```
A = 2×3
     2     3    -1
     2     0     1
```

```
B = [ 3 1 1 ; ...
    0 -2 6 ] ;
```

```
B
```

```
B = 2×3
     3     1     1
     0    -2     6
```

```
C = [ 1 5 ; ...
    -2 6 ; ...
    3 1 ] ;
C
```

```
C = 3×2
     1     5
    -2     6
     3     1
```

```
D = [ 4 -2 ; ...
    3 1 ; ...
    -2 2 ] ;
D
```

```
D = 3×2
     4    -2
     3     1
    -2     2
```

Calculate: " 2A - C^T + B " & " A · D ".

```
ans_2nd_1st = 2 .* A - C' + B ;
ans_2nd_1st
```

```
ans_2nd_1st = 2×3
     6     9    -4
    -1    -8     7
```

```
ans_2nd_2nd = A * D ;
ans_2nd_2nd
```

```
ans_2nd_2nd = 2×2
    19    -3
     6    -2
```

Question 03.

Create the matrices. (P/R/M/N)

```
disp("Question 03.") ;
```

```
Question 03.
```

```
P = [ 3 0 1 ; ...
    -4 1 5 ] ;
P
```

```
P = 2×3
     3     0     1
    -4     1     5
```

```
R = [ 3 -2 0 ; ...
    4 -1 1 ] ;
R
```

```
R = 2×3
     3    -2     0
     4    -1     1
```

```
M = [1 3 ; ...
    -2 1 ; ...
    0 4 ] ;
M
```

```
M = 3×2
     1     3
    -2     1
     0     4
```

```
N = [ 2 1 ; ...
    -3 0 ; ...
    1 3 ] ;
N
```

```
N = 3×2
     2     1
    -3     0
     1     3
```

(1) Calculate: " P + R ".

```
ans_3rd_1st = P + R ;
ans_3rd_1st
```

```
ans_3rd_1st = 2×3
     6    -2     1
     0     0     6
```

(2) Elements of matrix M divided by elements of matrix N.

```
ans_3rd_2nd = M ./ N ;
ans_3rd_2nd
```

```
ans_3rd_2nd = 3×2
    0.5000    3.0000
    0.6667       Inf
         0    1.3333
```

(3) Raise each element of matrix R to the fourth power.

```
ans_3rd_3rd = R .^ 4 ;
ans_3rd_3rd
```

```
ans_3rd_3rd = 2×3
    81    16     0
   256     1     1
```

Question 04.

Draw a graph of the function.

```
disp("Question 04.") ;
```

```
Question 04.
```

```
syms x_01 ;
numerator_01 = x_01 .^ 2 + 1 ;
denominator_01 = x_01 .^ 3 + 1 ;
y_01(x_01) = numerator_01 ./ denominator_01 ;
y_01(x_01)
```

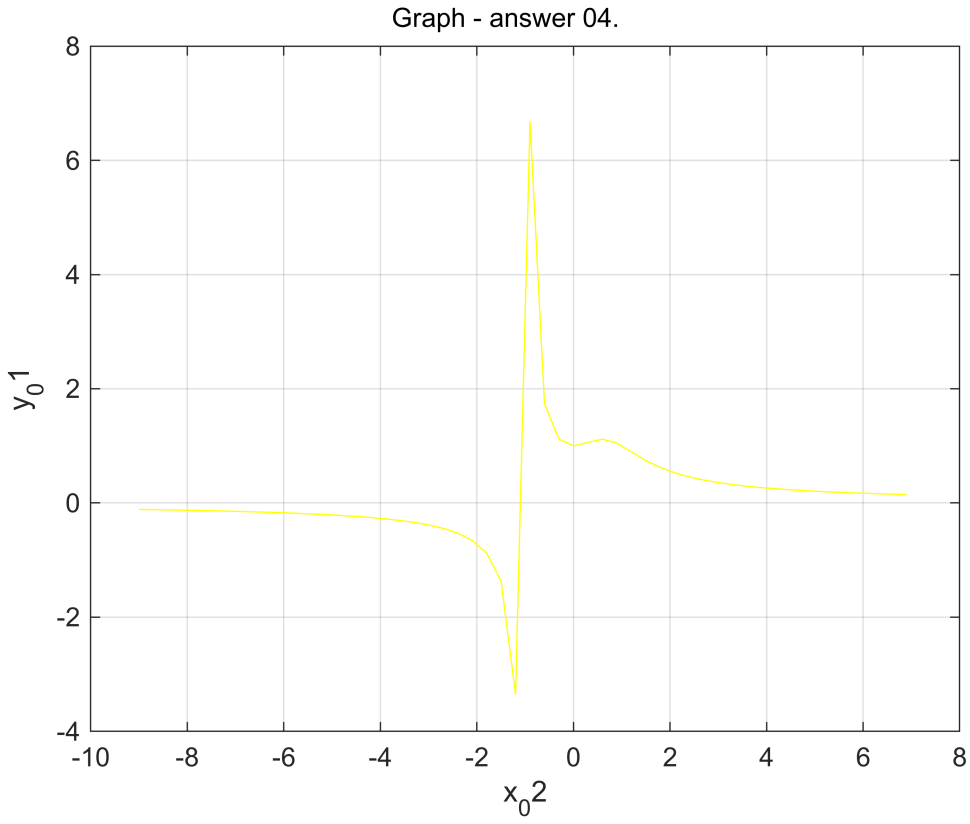
```
ans =
```

$$\frac{{x_{01}}^2 + 1}{{x_{01}}^3 + 1}$$

```
x_02 = -9:0.3:7 ;
x_02
```

```
x_02 = 1×54
   -9.0000   -8.7000   -8.4000   -8.1000   -7.8000   -7.5000   -7.2000   -6.9000 ···
```

```
figure ;
plot(x_02,y_01(x_02),"yellow") ;
xlabel('x_02') ;
ylabel('y_01') ;
grid on ;
sgtitle('Graph - answer 04.', 'FontSize', 10);
```



Question 05.

Plot the graph of the function.

```
disp("Question 05.") ;
```

```
Question 05.
```

```
syms x_03 ;
y_02(x_03) = 2 .* sin(x_03 ./ 2) ;
y_02(x_03)
```

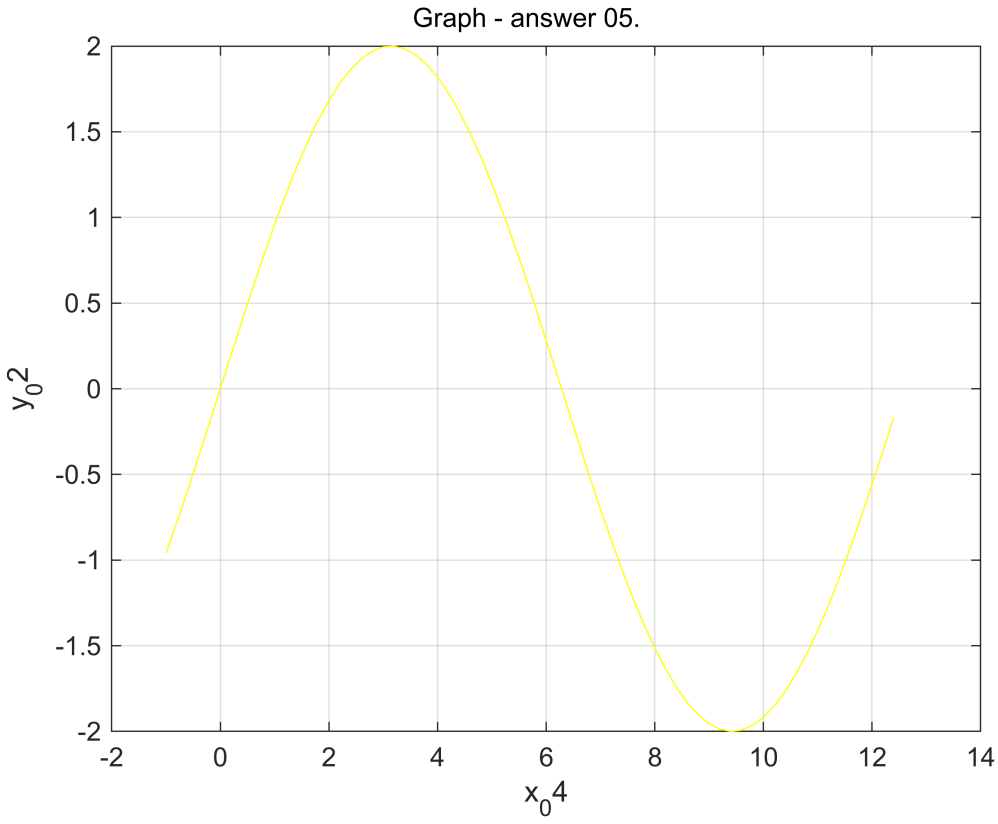
```
ans =
```

$$2\sin\left(\frac{x_{03}}{2}\right)$$

```
x_04 = -1:0.2:4.*pi ;
x_04
```

```
x_04 = 1×68
   -1.0000   -0.8000   -0.6000   -0.4000   -0.2000         0    0.2000    0.4000 ···
```

```
figure ;
plot(x_04,y_02(x_04),"yellow") ;
xlabel('x_04') ;
ylabel('y_02') ;
grid on ;
sgtitle('Graph - answer 05.', 'FontSize', 10);
```



Question 06.

Plot two graphs of the functions.

Choose the values so that you can see two points of intersection.

```
disp("Question 06.") ;
```

```
Question 06.
```

```
syms x_05 x_06 ;
% Define first function.
y_03(x_05) = (x_05 - 1).^2 ;
y_03(x_05)
```

ans = $(x_{05} - 1)^2$

```
% Define second function.
y_04(x_06) = x_06 + 1 ;
y_04(x_06)
```

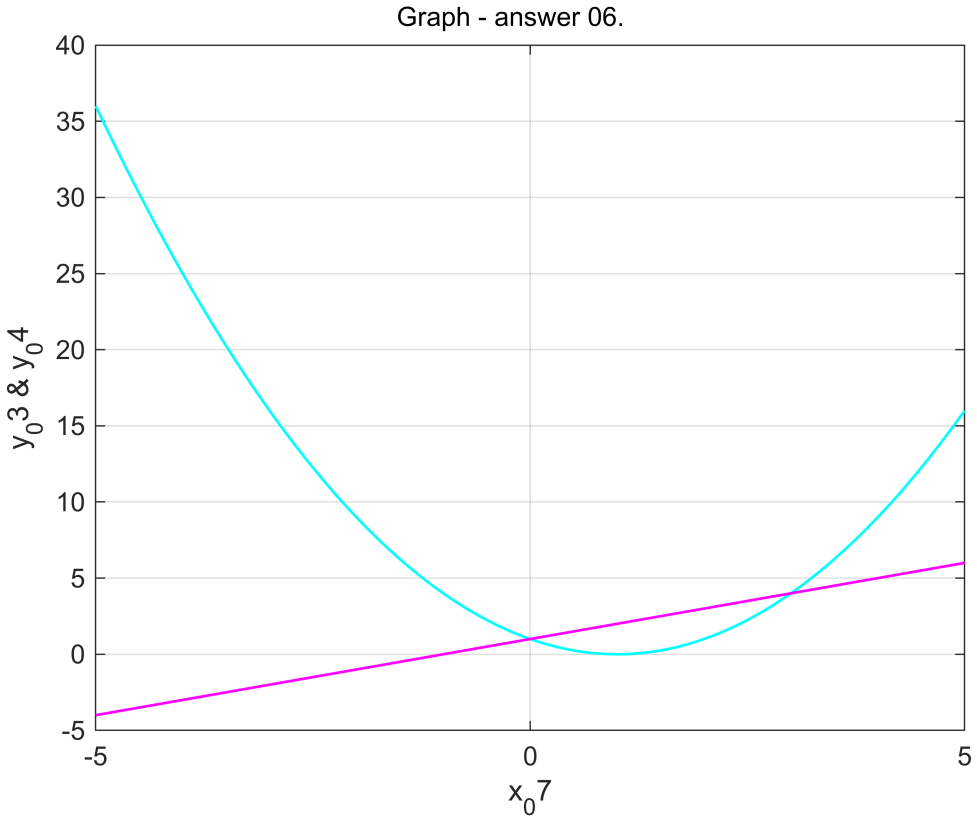
ans = $x_{06} + 1$

```
% Define variable range.
x_07 = -5:0.1:5 ;
x_07
```

x_07 = 1×101

```
    -5.0000   -4.9000   -4.8000   -4.7000   -4.6000   -4.5000   -4.4000   -4.3000 ···
```

```
% Create figure space.
figure ;
% Draw both graphs together.
plot(x_07, y_03(x_07), 'cyan', x_07, y_04(x_07), 'magenta', 'LineWidth', 1) ;
xlabel('x_07') ;
ylabel('y_03 & y_04') ;
grid on ;
% Add an overall title to the figure space.
sgtitle('Graph - answer 06.', 'FontSize', 10);
```



Question 07.

Use subplots to create a figure containing a 2-by-4 grid of graphs. Plot a graph of the functions.

```
disp("Question 07.") ;
```

```
Question 07.
```

```
syms x_08 x_09 ;
% Define first function.
y_05(x_08) = x_08 .* sqrt(9 - x_08.^2) ;
y_05
```

```
y_05(x_08) =
```

$$x_{08}\sqrt{9-x_{08}^2}$$

```
% Define second function.
y_06(x_09) = exp(x_09) + 6 ;
y_06
```

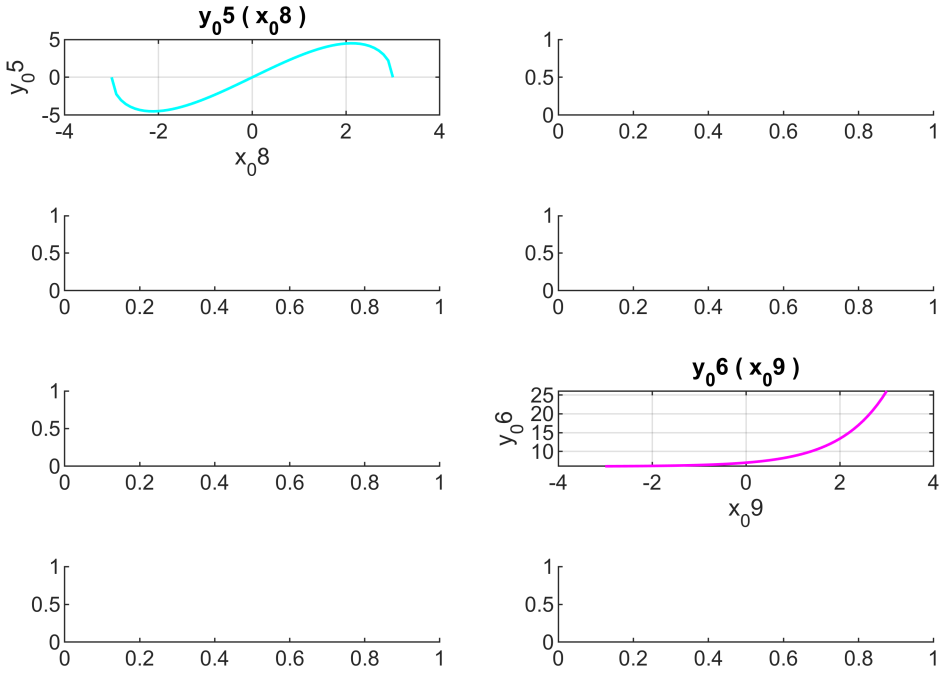
y_06(x_09) = $e^{x_{09}} + 6$

```
% Define variable range.
x_10 = -3:0.1:3 ;
x_10
```

```
x_10 = 1×61
   -3.0000   -2.9000   -2.8000   -2.7000   -2.6000   -2.5000   -2.4000   -2.3000 ···
```

```
% Create figure space.
figure;
% Create 08 subplots (empty by default).
subplot(4, 2, 1); subplot(4, 2, 2); subplot(4, 2, 3); subplot(4, 2, 4);
subplot(4, 2, 5); subplot(4, 2, 6); subplot(4, 2, 7); subplot(4, 2, 8);
% Draw graph for 'y_05 ( x_08 )' in the 01st subplot.
subplot(4, 2, 1);
plot(x_10, y_05(x_10), 'cyan', 'LineWidth', 1);
title('y_05 ( x_08 )');
xlabel('x_08');
ylabel('y_05');
grid on;
% Draw graph for 'y_06 ( x_09 )' in the 06th subplot.
subplot(4, 2, 6);
plot(x_10, y_06(x_10), 'magenta', 'LineWidth', 1);
title('y_06 ( x_09 )');
xlabel('x_09');
ylabel('y_06');
grid on;
% Add an overall title to the figure space.
sgtitle('Graph - answer 07.', 'FontSize', 10);
```

Graph - answer 07.



The end.

```
disp('credits: coded & submitted by "Swarn Singh Warshaneyan" as a part of the
"M.Eng.-I.T." program');
```

```
credits: coded & submitted by "Swarn Singh Warshaneyan" as a part of the "M.Eng.-I.T." program
```

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