Name: ID: .

1. Writ a MATLAB script to represent the following matrix, and identify element in (second row - third column), and element in (third row - second column).   PTS: 10

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Solution:

>>A= [1 2 3; 4 5 6; 7 8 9]

Ans =

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

>>A(2,3)

ans =

        6

>>A(3,2)

ans =

        8

2. Write MATLAB script to calculate, **A² + B² – AB**, and **A.Aᵀ/log(B²)** in format short.

$$A = \begin{bmatrix} 1 & o & 1 \\ 2 & 3 & 4 \\ -1 & 6 & 7 \end{bmatrix} \qquad B = \begin{bmatrix} 7 & 4 & 2 \\ 2 & 5 & 6 \\ -1 & 2 & 1 \end{bmatrix}$$

PTS: 10 points

Solution:

>>format short;

>>A = [1 0 1; 2 3 4; -1 6 7];

>>B = [7 4 2; 2 5 6; -1 2 1];

>> S1 = (A^2 + B^2 – A*B)

>>S2 = A*A'/log10(B^2)

3. Write MATLAB script to solve the following system of equation.

P + x + 4y + 3z = 5
2P + 3x + y - 2z = 1   PTS: 15 points
P + 2x -5y + 4z = 3
          P - 3z = 9

Solution:

>> eq1 = P + x + 4y + 3z = 5;
>>eq2 = 2P + 3x + y - 2z = 1;
>>eq3 = P + 2x -5y + 4z = 3;
>>eq4 = P - 3z = 9;

>> s = solve(eq1, eq2, eq3, eq4);

>>p = s.p
        P =
              1404.127
>>x = s.x

$$X =$$
$$-818/127$$

>>y = s.y
$$Y =$$
$$-53/127$$

>>z = s.z
$$Z =$$
$$87/127$$

4. Solve the following second order differential equation and plot the solution for -50<x<50

$$\frac{d^2f}{dx^2} - \frac{sinx}{x}\left(1 - \frac{2}{x^2}\right) - \frac{2cosx}{x^2} = 0, \quad for\ f(0) = 2\ and\ f'(0) = 0$$

PTS: 10 points

Solution:

>>g = **desolve**('D2f – sin(x)/x – 2*cos(x)/x^2 + 2*sin(x)/x^2 = 0', 'f(0) = 2', Df(0) = 0', 'x')

g =

-sin(x)/x + 3

>>ezplot (g, [-50, 50])

5. What is the area under the curve f(x) = x² cos(x) for   -6< x < 6,and plot the function in red, with labels x and y, title x² cos(x) and legend 'Area integration'.   PTS: 10 points

Solution

>>f= x^2*cs(x);
>>a = **int**(f, -6, 6)

ans =
        68*sin(6) +24*cos(6)

>>double (a)

ans =
        4.0438

>> plot(f, 'r', xlalel ('x'), ylabel('y'), title('x² cos(x)'), legend('Area integration'))

6. Solve the following integration,

$$\int_0^\pi \int_0^{sinx} (x^2 + y^2)dydx$$

PTS: 10-points

Solution:

>>int(int(x^2+y^2)dydx, y, 0, sin(x)), 0, pi)

ans =

Pi^2 – 32/9

7. Plot the 3-D function   PTS: 15 points

X = (a+bcosv)cosu
Y = (a + bcosv)sinu
Z = bsinv

0<u<2π, and 0<v<2π, and a=5, b= 1

Solution:

```
>>a=5,  b=1;
>>u = linspace(0, 2*pi, 40);
>>v = u;
>>x = (a+b*cos(v)).*cos(u);
>>y= (a+b*cos(v))*sinu;
>>z=b*sin(v);
Surf(x,y,z, 'face color', 'interp', 'facelighting', axis equal, axis off, view (150, 20),...
title ('Torus.')
```

8. Plot function f1 in dotted and f2 in solid lines on the same plot with legend …… F1, and _____ F2, and x between 0 to 5 with 0.1 divisions, title: Multiple Function Plot, x-label, X, and ylable Y, and with grid.   PTS: 10 points

    F1= x² – 3x +2
    F2 = 2x² + x -3

    Solution:

        >> x = 0:0.1:5;
        >>f(:, 1) = x.^2 – 3*x + 2;
        >>f2(-, 2) = 2*x^2 +x-3;
        >> plot (x,f)
        >> title('Multiple Function Plot'), xlabel('X), ylabel('Y'), grid on, legend ('F1', F2')

If students write scripts in one line or multiple lines, they get full mark.

9. Find the **Laplace transform** of

$$v(t) = 3e^{-2t} \sin 5t + 4e^{-2t} \cos 5t$$

and **invers Laplace transform** of.

$$F(s) = \frac{25}{S+3} + \frac{48}{(S+2)(S^2+16)}$$

                                                                10-points

    Solution:
        % Laplace transform
        >> v = 3*exp(-2*t)*sin(5*t) + 4*exp(-2*t)*c0s(5*t);
        >> V= laplace (v)

        % Inverse Laplace transform

        >>F = 25/(S+3) + 48/((S+2)*(S^2+16));
        >>f = ilaplace(F)