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**15/ENG08/031**

**PETROLEUM ENGINEERING**

# **PTE 521 ASSIGNMENT**

1. function [F] = fsolveocheni(x)

F(1) = (2\*x)-(2\*y)-z-;

F(2)=((4\*x)+(5\*y)-(2\*z)+3);

F(3) = ((3\*x)+(4\*y)-(3\*z));

fun=@myfun;

x0 = [0,0];

F(1,1)= (2\*x(1))-(2\*x(2))-x(3)-3;

F(1,2)= (4\*x(1))+(5\*x(2))-(2\*x(3))+3;

F(1,3)=(3\*x(1))+(4\*x(2)-(3\*x(3));

2. The differences between Fsolve and Fzero commands are:

|  |  |
| --- | --- |
| **Fsolve Command** | **Fzero Command** |
| Fsolve can be used to solve for the zero of a single variable equation | Fzero will find the zero if and only if the function crosses the x-axis. |
| Fsolve solves a SYSTEM of non-linear equations F(x) where x is multivariate. | Fzero finds the root of a function (of one variable) in an interval [a,b]. It REQUIRES that f(a)\*f(b)<0. Not every polynomial can be rooted by fzero. |
| It use three different methods 'trust-region-dogleg' (default), 'trust-region', and 'levenberg-marquardt', depending on user needs. | Fzeros uses a combination of bisection, secant, and inverse quadratic interpolation methods. |

3. Using MATLAB software the system is expressed in a matrix for using the code below:

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

A =

2 -2 -1

4 5 -2

3 4 -3

B = [3;-3;-7]

B =

3

-3

-7

4. Using MATLAB software the values of x, y and z are found using the code below:

X=linsolve(A,B)

X =

2

-1

3

5. Using MATLAB software to determine if the system is stable using the code below:

‘plot(A,B)’



From the above plot, it can be concluded that the system is not stable.

6. Using MATLAB software the Eigen values were found using the code below:

E=eig(A)

E =

2.7976 + 3.0165i

2.7976 - 3.0165i

-1.5952 + 0.0000i

7. Using MATLAB software the Eigen vectors were found using the code below:

(Where the code calculates the right eigenvectors, V, and the left eigenvectors, W)

[V,W] = eig(A)

V =

-0.1687 + 0.5550i -0.1687 - 0.5550i 0.3155 + 0.0000i

0.6920 + 0.0000i 0.6920 + 0.0000i 0.0950 + 0.0000i

0.4246 + 0.0663i 0.4246 - 0.0663i 0.9442 + 0.0000i

W =

0.6975 + 0.0000i 0.6975 + 0.0000i -0.0999 + 0.0000i

0.3395 - 0.5689i 0.3395 + 0.5689i -0.5380 + 0.0000i

-0.2672 + 0.0572i -0.2672 - 0.0572i 0.8370 + 0.0000i

8. Using MATLAB software to show whether the matrix is singular or not, the code below was used:

d = det(A)

d = -27

A matrix is singular if and only if the determinant of the matrix is 0. Therefore, since the determinant of the matrix A is solved to be -27, the matrix is not singular.

9. Using MATLAB software to obtain an identity matrix (I), the code below was used:

1. The inverse of matrix A was obtained

a= inv(A)

a =

0.2593 0.3704 -0.3333

-0.2222 0.1111 0

-0.0370 0.5185 -0.6667

1. The inverse of matrix A was multiplied by matrix A

I=a\*A

I =

1.0000 -0.0000 -0.0000

0 1.0000 0

0.0000 0 1.0000

10. Using MATLAB software to give the cofactors of matrix A, the code below was used:

CofactorsA = a\*d

CofactorsA =

-7.0000 -10.0000 9.0000

6.0000 -3.0000 0

1.0000 -14.0000 18.0000

Where a = inv(A)

b = det(A)