ENGR 1204 Programming Languages in Engineering
Homework 3

The first problem is from S. Attaway, MATLAB – A Practical Introduction to Programming and Problem Solving (5th Edition).

For each problem, print out the script file if created along with the function file(s) and the relevant Command Window output. Also, show analytical work where appropriate.

1. (50 points) Chapter 6 – Exercise 21

2. (50 points) Create the function files det2 and det3 shown in the Week4 PowerPoint slides. Then write a script which accesses det3 to solve the equations

$$\begin{aligned} a\,x + b\,y + c\,z &= k1 \\ d\,x + e\,y + f\,z &= k2 \\ g\,x + h\,y + i\,z &= k3 \end{aligned}$$

Verify by solving the simultaneous equations

$$\begin{aligned} 3\,x + 2\,y + z &= 5 \\ -\,x + 5\,y - 2\,z &= -3 \\ 4\,x - 7\,y + 3\,z &= 10 \end{aligned}$$

Start your script with the following (fill in the blanks):

```
a = 3; b = 2; _________;  i = 3;
k1 = 5; ____________
det   = det3(  a, b, c, _________);
detx = det3(k1, b, c, _________);
dety = _________
detz = _________
x = detx / det,   y = _________ ,          z = _________
```

Finally, have your script verify the solution by substituting the values of x, y and z back into the equations. The procedure using determinants to solve two and three linear simultaneous equations is shown on the next page.

Solving Linear Simultaneous Equations using Determinants

Two equations with two unknowns:

$$a\,x + b\,y = k_1$$

$$c\,x + d\,y = k_2$$

Solution: $x = detx / det$

$y = dety / det$

where $det = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$ $detx = \begin{vmatrix} k_1 & b \\ k_2 & d \end{vmatrix}$ $dety = \begin{vmatrix} a & k_1 \\ c & k_2 \end{vmatrix}$

Three equations with three unknowns:

$$a\,x + b\,y + c\,z = k_1$$

$$d\,x + e\,y + f\,z = k_2$$

$$g\,x + h\,y + i\,z = k_3$$

Solution: $x = detx / det$

$y = dety / det$

$z = detz / det$

where $det = \begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix}$ $detx = \begin{vmatrix} k_1 & b & c \\ k_2 & e & f \\ k_3 & h & i \end{vmatrix}$ $dety = \begin{vmatrix} a & k_1 & c \\ d & k_2 & f \\ g & k_3 & i \end{vmatrix}$ $detz = \begin{vmatrix} a & b & k_1 \\ d & e & k_2 \\ g & h & k_3 \end{vmatrix}$