1. Data from an unknown function $y = f(x)$ is shown in the table below.

X	y	f1[ ]	f2[ ]	f3[ ]
0	1			
1	0			
2	3			
4	45			

Fill in the table of divided differences and find the equation of the Newton Divided Difference polynomial

$$f_3(x) = b_0 + b_1(x - x_0) + b_2(x - x_0)(x - x_1) + b_3(x - x_0)(x - x_1)(x - x_2)$$

Numerical values of the coefficients are: (3 pts)

a) $b_0 = 1,$ $b_1 = 2,$ $b_2 = 3,$ $b_3 = 4$

b) $b_0 = 1,$ $b_1 = -1,$ $b_2 = 2,$ $b_3 = -1$

c) $b_0 = 1,$ $b_1 = 2,$ $b_2 = -1,$ $b_3 = 1$

d) $b_0 = 1,$ $b_1 = -1,$ $b_2 = 2,$ $b_3 = 1$

e) none of the above

X	y	f1[ ]	f2[ ]	f3[ ]
0	1			
		-1		
1	0		2	
		3		1
2	3		6	
		21		
4	45			

Using $f_3(3)$ to estimate $y = f(3)$ results in   (2 pts)

a) 0   b) 12   c) 15   d) 16   e) 25   f) none of the above

$$f_3(x) = 1 - (x - 0) + 2(x - 0)(x - 1) + (x - 0)(x - 1)(x - 2)$$

$$= 1 - x + 2x(x - 1) + x(x - 1)(x - 2)$$

$$f_3(3) = 1 - 3 + 2(3)(3 - 1) + 3(3 - 1)(3 - 2)$$

$$= 16$$

2. Consider the Matlab statements

```
x=0:3
y=3:-1:0
w=linspace(0,3,3)
```

```
x =   0   1       2       3
y =   3   2       1       0
w =   0   1.5000  3.0000
```

i) The Matlab statement z=x+y+w   (1 pt)

a) will result in an error message   b) will execute without an error message

??? Error using ==> plus

Matrix dimensions must agree.

ii) The Matlab statement z=exp (x)   (1 pt)

a) will result in an error message   b) will execute without an error message

z =   1.0000   2.7183   7.3891   20.0855

iii) The Matlab statement z=exp(x)*exp(y)   (1 pt)

    a) will result in an error message   b) will execute without an error message

    ??? Error using ==> mtimes

    Inner matrix dimensions must agree.

iv) The Matlab statement z=x.*exp(x)   (1 pt)

    a) will result in an error message   b) will execute without an error message

    z = 0   2.7183   14.7781   60.2566

v) The Matlab statement z=y.*exp(w)   (1 pt)

    a) will result in an error message   b) will execute without an error message

    ??? Error using ==> times

    Matrix dimensions must agree.