

**NAME: Patrick Dillon Ryan**

**STUDENT NUMBER: 17340382**

**Please indicate your answers by entering the option ( i), (ii), (iii) or (iv) ) where asked.  
You should append the completed document as a pdf with your type written worked solutions and upload to Blackboard by Friday 22<sup>nd</sup> of February 2019.**

**Q 2.31**

Part (a):

- (i) 4
- (ii) 13
- (iii) 26
- (iv) 18

**Your Answer (i)-(iv): (ii)**

**Proof**

$$\text{Det}(A) = 1 * (3 - 6) - 5 * ((2 - 6) + 4 * (2 - 3)) = -3 + 20 - 4 = 13$$

Part (b):

- (i) 0
- (ii) 12
- (iii) 7
- (iv) 4

**Your Answer (i)-(iv): (i)**

$$\begin{aligned} \text{Det}(B) = & 1(6(11 \times 16 - 12 \times 15) - 7(10 \times 16 - 12 \times 14) + 8(10 \times 15 - 11 \times 14)) - 2(5(11 \times 16 - 12 \times 15) - \\ & 7(9 \times 16 - 12 \times 13) + 8(9 \times 15 - 11 \times 13)) + 3(5(10 \times 16 - 12 \times 14) - 6(9 \times 16 - 12 \times 13) + 8(9 \times 14 - 10 \times 13)) - \\ & 4(5(10 \times 15 - 11 \times 14) - 6(9 \times 15 - 11 \times 13) + 7(9 \times 14 - 10 \times 13)) = 0 \end{aligned}$$

### Q 3.2

Part (a):

- (i) 0.1241
- (ii) 0.8125
- (iii) 0.074995
- (iv) 0.003462

**Your Answer (i)-(iv): (ii)**

$$f(x) = x - 2e^{-x}$$

A

$$a = 0, b = 1 \quad x_1 = \frac{a+b}{2} = 0.5$$

$$f(a) = f(0) = 0 - 2e^0 = -2 \quad f(0.5) = 0.5 - 2e^{-0.5} = -0.71 \quad -2 * -0.71$$

$$a = 0.5, b = 1 \quad x_2 = 0.75$$

$$f(0.75) = 0.75 - 2e^{-0.75} = -0.19 \quad -0.71 * -0.19$$

$$a = 0.75, b = 1 \quad x_3 = 0.875 \quad f(0.875) = 0.875 - 2e^{-0.875} = 0.04$$

We use the interval  $[.75, 1]$

$$\frac{.75 + .875}{2} = .8125$$

$$\text{Answer} = 0.8125$$

Part (b):

- (i) 0.72481
- (ii) 0.85261
- (iii) 0.62849
- (iv) 0.17238

**Your Answer (i)-(iv): (ii)**

B

$$x_{i+1} = x_i - \frac{f(x_i)(x_{i-1} - x_i)}{f(x_{i-1}) - f(x_i)}$$

$$x_1 = 0, x_2 = 1$$

$$f(0) = -2, f(1) = 0.26424 \quad x_3 = 1 - \frac{0.26424(0 - 1)}{-2 - 0.26424} = 0.8338$$

$$f(0.8338) = 0.05647 \quad x_4 = 0.8338 - \frac{0.05647(1 - 0.8338)}{0.26424 - 0.05647} = 0.851582$$

$$f(0.851582) = -0.005 \quad x_5 = 0.851582 - \frac{-0.005(0.8338 - 0.851582)}{0.058367 + 0.005} = 0.85261$$

$$\text{Answer} = 0.85261$$

Part (c):

- (i) 0.65782
- (ii) 0.59371
- (iii) 0.45802
- (iv) 0.85261

**Your Answer (i)-(iv): (iv)**

C

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$$

$$f(x) = x - 2e^{-x}$$

$$f'(x) = 1 + 2e^{-x}$$

$$x_1 = 1$$

$$x_2 = 1 - \frac{1 - 2e^{-1}}{1 + 2e^{-1}} = 0.847777$$

$$x_3 = 0.847777 - \frac{0.847777 - 2e^{-0.847777}}{1 + 2e^{-0.847777}} = 0.85261$$

#### Q 4.24

(i) Inverse(a)=

-0.7143	0.0	1.4286
0.2571	0.1000	0.2857
-0.2286	-0.2000	0.8571

Inverse(b)=

1.6667	2.8889	-2.2222	1.0000
0.0	0.3333	-0.3333	0.0
-0.3333	-0.4444	0.1111	0.0
1.5000	2.0000	-1.5000	0.5000

(ii)

Inverse(a)=

0.7243	0.0	1.3286
1.2571	0.1000	0.2757
-0.2386	-0.2010	0.9571

Inverse(b)=

1.6677	2.9889	3.2222	1.01700
0.3433	-0.3433	0.3333	0.00371
-0.3433	-0.2879	0.2111	0.0
1.2400	2.0120	-1.5783	0.5600

(iii)

Inverse(a)=

0.7143	0.003	2.3276
1.2671	0.1100	0.3759
-0.2486	-0.2110	0.9771

Inverse(b)=

1.6877	3.9789	3.2002	2.01800
0.3533	-0.4433	0.3333	0.02371
-0.3443	-0.2999	0.3121	0.0382
1.2420	3.0130	-1.5733	0.5610

(iv)

Inverse(a)=

0.8343	1.01	1.3336
2.2572	0.1003	0.3857
-0.2486	-0.2110	0.9671

Inverse(b)=

1.6777	4.9889	3.2232	1.11700
0.3443	-0.3443	0.3233	0.07371
-0.3443	-0.2979	0.3211	0.07800
1.2480	2.1220	-1.5883	0.5621

### Your Answer (i)-(iv): (i)

#### Code

```
a = [-1,2,1; 2,2,-4; 0.2,1,0.5];
b = [-1,-2,1,2; 1,1,-4,-2; 1,-2,-4,-2; 2,-4,1,-2];

answer = Inverse(a);
disp(answer);
answer = Inverse(b);
disp(answer);

function inverseOfMatrx = Inverse(matrx)
    [m,n] = size(matrx);
    inverseOfMatrx = eye(m); %creating an identity matrix
    for j = 1:m
        temp = 1/matrx(j,j);
        for k = 1:m
            matrx(j,k) = temp * matrx(j,k); %iterate across row j - to
make diagonals one
            inverseOfMatrx(j,k) = temp * inverseOfMatrx(j,k); %Everything
that gets done to matrx is also done to inverseOfMatrx
        end
        for i = 1:m
            if i ~= j %for elements in the colum not part
of the diagonal
                temp = -matrx(i,j);
                for k = 1:m %making non diagonals become zeros
                    matrx(i,k) = matrx(i,k) + temp * matrx(j,k);
                    inverseOfMatrx(i,k) = inverseOfMatrx(i,k) + temp *
inverseOfMatrx(j,k); %again, execute operations on matrx and
inverseOfMatrx
                end
            end
        end
    end
end
```

>> Q3

```
-0.7143  0.0000  1.4286
 0.2571  0.1000  0.2857
-0.2286 -0.2000  0.8571
```

```
1.6667  2.8889 -2.2222  1.0000
  0  0.3333 -0.3333   0
-0.3333 -0.4444  0.1111   0
1.5000  2.0000 -1.5000  0.5000
```