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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 22nd of February 2019.

Q 2.31 (see Matlab code)

Part (a):

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

Your Answer (i)-(iv): (ii) 13

Part (b):

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

Your Answer (i)-(iv): (i) 0

```matlab
%Creating function Determinant()
function det = Determinant(A)
%size of the matrix
[m, n] = size(A);
%check if square matrix
if(m ~= n)
    disp("The matrix has to be a square matrix");
    return;
end
%2*2 matrix
if (m==2)
    b = A(1,1) * A(2,2);
    c = A(1,2) * A(2,1);
    D = b-c;

end

%3*3 matrix
elseif (m==3)
    b = [A(2,2) A(2,3);
         A(3,2) A(3,3)];
    c = [A(2,1) A(2,3);
         A(3,1) A(3,3)];
    k = [A(2,1) A(2,2);
         A(3,1) A(3,2)];

    d1 = A(1,1) * Determinant(b);
    d2 = A(1,2) * Determinant(c);
    d3 = A(1,3) * Determinant(k);

    D = d1 - d2 + d3;

%4*4 matrix
elseif (m==4)
    b = [A(2,2) A(2,3) A(2,4);
         A(3,2) A(3,3) A(3,4);
         A(4,2) A(4,3) A(4,4)];
    c = [A(2,1) A(2,3) A(2,4);
         A(3,1) A(3,3) A(3,4);
         A(4,1) A(4,3) A(4,4)];
    k = [A(2,1) A(2,2) A(2,4);
         A(3,1) A(3,2) A(3,4);
         A(4,1) A(4,2) A(4,4)];
    w = [A(2,1) A(2,2) A(2,3);
         A(3,1) A(3,2) A(3,3);
         A(4,1) A(4,2) A(4,3)];

    d1 = A(1,1) * Determinant(b);
    d2 = A(1,2) * Determinant(c);
    d3 = A(1,3) * Determinant(k);
    d4 = A(1,4) * Determinant(w);

    D = d1 - d2 + d3 - d4;

end
```

Q 3.2

Part (a):

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

Your Answer (i)-(iv): (ii) 0.8125

Iteration 1: a = 0 b=1 X_{NS1} = ((0+1)/2) = 0.5
             f(a) . f(X_{NS1}) = 1.426
              f(a) . f(X_{NS1}) > 0, therefore, a = 0.5
Iteration 2: a = 0.5 b=1 X_{NS1} = ((0.5+1)/2) = 0.75
             f(a) . f(X_{NS1}) = 0.1388
              f(a) . f(X_{NS1}) > 0, therefore, a = 0.75
Iteration 3: a = 0.75 b=1 X_{NS1} = ((0.75+1)/2) = 0.875
             f(a) . f(X_{NS1}) = -0.0080
              f(a) . f(X_{NS1}) < 0, therefore, b = 0.875
Iteration 4: a = 0.75 b=0.875 X_{NS1} = ((0.75+0.875)/2) = 0.8125
             f(a) . f(X_{NS1}) = -0.0146
              Answer = 0.8125

Part (b):

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

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

Your Answer (i)-(iv): (ii) 0.85261

Iteration 1 = $X_i = 1$ $X_{i-1} = 0$

$$X_{i+1} = 1 - \frac{f(1)(0-1)}{f(0)-f(1)}$$

= 0.8833

$f(0.8833) = 0.0564$

Iteration 2 = $X_i = 0.8833$ $X_{i-1} = 1$

$$X_{i+1} = 0.8833 - \frac{f(0.8833)(1-0.8833)}{f(1)-f(0.8833)}$$

= 0.85613

$f(0.85613) = -0.001807$

Iteration 3 = $X_i = 0.85613$ $X_{i-1} = 0.8833$

$$X_{i+1} = 0.85613 - \frac{f(0.85613)(0.8833-0.85613)}{f(0.8833)-f(0.85613)}$$

= 0.85261

Part (c):

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

Your Answer (i)-(iv): (iv) 0.85261

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

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

Iteration 1: $X_i = 1$

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

$X_{i+1} = 0.8477662305$

Iteration 2: $X_i = 0.8477662305$

$X_{i+1} = 0.8477662305 - \frac{f(0.8477662305)}{f'(0.8477662305)}$

$X_{i+1} = 0.8526001078$

Iteration 3: $X_i = 0.8526001078$

$X_{i+1} = 0.8526001078 - \frac{f(0.8526001078)}{f'(0.8526001078)}$

$X_{i+1} = 0.852605502$

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) (See Matlab code)

```
%Creating function Inverse()
function inv = Inverse(inv)
%size of matrix
[m, n] = size(A);
if (m~=n)
    disp('Matrix must be a square matrix');
    return;
end
identity = zeros(m);
for i = 1:m
    identity(i,i) = 1;
end

for i = 1:m
    if A(i,i) ~= 1
        tmp = A(i,i);
        for j = 1:m
            A(i,j) = A(i,j)/tmp;
            identity(i,j) = identity(i,j)/tmp;
        end
    end

    for k = 1:n
        if i ~=k && A(k,i) ~=0
            tmp = A(k,i);
            for j = 1:m
                A(k,j) = A(k,j) - (tmp*A(i,j));
                identity(k,j) = identity(k,j) - (tmp*identity(i,j));
            end
        end
    end
end
end
```