Math assignment 1

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Question 1 answer

option D - 1 1

Explainaition -

```
>> x=[7:9; 6 12 19;-2:0];
>> y=x(3,:);
>> w=y(1,3);
>> size(w)

ans =

     1     1

>>
```

Question 2 answer

option C - [6 0 12 12]+[0 6 12 0]

Explainaition -

We epresent in the following format - [x^3 x^2 x C]

```
>> [6 0 12 12]+[0 6 12 0]

ans =

     6     6    24    12

>>
```

Question 3 answer

option D - 1 1

Explainaition -

```
>> x=[7:9; 6 12 19;-2:0];
>> y=x(3,:);
>> w=y(1,3);
>> size(w)

ans =

     1     1

>>
```

Question 4 answer

option A - 5

Explainaition -

Given a function f(x) =cosx

exact value od cos1 = 0.5403

By using taylor's series expasnion at a=0

cosx = 1- x^2/2! + x^4/4! + x^6/6! + x^8/8! + x^10/10! + ...

for x=1

cos1 = Pn(1) = 1 - 1/2! + 1/4! + 1/6! + 1/8! + 1/10! + ...

for t = 1.0 x 10^-5 = 0.00001such that [cos1 - Pn(1)] < t

now,

P3(1) = 1 - 1/2! + 1/4! = 0.5416

P4(1) = 1 - 1/2! + 1/4! + 1/6! = 5402

P5(1) = 1 - 1/2! + 1/4! + 1/6! + 1/8! = 0.5403

[cos1 - P5(1)] = [0.5403023 - 0.5403025]

= 0.00000027 < t

hence minimum degree is 5

Question 5 answer

option C - 11

The number of iterations it takes to find a root depnds on the acceptable rror. At each iteration in the bisection method the absolute error becones half of the previous iteration, Therefore

E = b-a/2^n = logz(b-a/e)

bisecion mehod states

n >= log(b - a) - log E / log2

So,

n>= log(2-0.5) - log(0.001)/log2

n>= 0.17609 - 3 / 0.30102

n >= 10.55

Hence n=11 iterations

Question 6 answer

option E - none of the above

Explaination-

-1	1	-4	1	0	0
-2	2	1	0	1	0
3	3	2	0	0	1

we ll find the inverse first

-1	1	-4	1	0	0
-2	2	1	0	1	0
3	3	2	0	0	1

R1 <- R1 divided by (-1)

-1	-1	-4	-1	0	0
-2	2	1	0	1	0
3	3	2	0	0	1

R2 <- R2 + 2xR2

-1	-1	-4	-1	0	0
0	0	9	-2	1	0
3	3	2	0	0	1

R3 <- R3 - 3xR1

-1	-1	-4		-1	0	0
0	0	9		-2	1	0
0	6	-10		3	0	1

interchanging rowa R2<->R3

-1	-1	-4		-1	0	0
0	6	-10		3	0	1
0	0	9		-2	1	0

R2 <- R2 divided by 6

-1	-1	-4		-1	0	0
0	1	-5/3		1/2	0	1/6
0	0	9		-2	1	0

R1 <- R1 + R2

1	0	7/3		-1/2	0	1/6
0	1	-5/3		1/2	0	1/6
0	0	9		-2	1	0

R3 <- R3 divided by 9

1	0	7/3		-1/2	0	1/6
0	1	-5/3		1/2	0	1/6
0	0	1		-2/9	1/9	0

R1 <- R1 - 7/3xR3

1 0 0 1/54 -7/27 1/6

0 1 -5/3 1/2 0 1/6

0 0 1 -2/9 1/9 0

R2 <- R2 + 5/3xR3

1 0 0 1/54 -7/27 1/6

0 1 0 7/54 5/27 1/6

0 0 1 -2/9 1/9 0

Solution:

1/54 -7/27 1/6

7/54 5/27 1/6

-2/9 1/9 0

Question 7 answer

option D - x = (1,2,1)T

Explaination-

0 4 1 | 9

1 1 3 | 6

2 -2 1 | -1

R2 <-> R1

1 1 3 | 6

0 4 1 | 9

2 -2 1 | -1

R3 -> R3 - 2R1

1 1 3 | 6

0 4 1 | 9

0 -4 -5 | -13

R1 -> 4R1 - R2, R3 -> R3 + R2

4 0 11 | 15

0 4 1 | 9

0 0 -4 | -4

R2 -> 4R2 + R3, R1 -> 4R1 + 11R3

16 0 0 | 16

0 4 1 | 9

0 0 -4 | -4

R2 -> R2/16, R1 ->R1/16, R3->R3/-4

1 0 0 | 1

0 1 1 | 2

0 0 1 | 1

(X1,X2,X3) = (1,2,1)T

Question 8 answer

option E - none of the above

$$\begin{pmatrix} 1 & 8 & 6 \\ 7 & 3 & 1 \\ 6 & 7 & 12 \end{pmatrix} \begin{pmatrix} x1 \\ x2 \\ x3 \end{pmatrix} = \begin{pmatrix} 6 \\ -8 \\ 2 \end{pmatrix}$$

$x1 + x2 + 6x3 = 6$

$7x1 + 3x2 + x3 = -8$

$6x1 + 7x2 + 12x3 = 2$

we put the equations in suitable order to use gauss-sided method

$7x1 + 3x2 + x3 = -8$ {1}

$x1 + x2 + 6x3 = 6$ {2}

$6x1 + 7x2 + 12x3 = 2$ {3}

from {1}

$x1 = 1/7[-8-3x2-x3]$ {4}

$x2 = 1/8[6-x1-6x3]$ {5}

$x3 = 1/12[2-6x1-7x2]$ {6}

intial approximation -> x1=2, x2=4, x3=5

$x1 = 1/7[-8-3x2-x3] = 1/7[-8-3(4)-5] = -25/7 = -3.5714$

$x2 = 1/8[6-x1-6x3] = 1/8[6-3.5714-6(5)] = -2.5535$

$x3 = 1/12[2-6x1-7x2] = 1/12[2-6(-3.5714)-7(-25535)] = 3.4419$

upon doing all the 2nd iteartion we get,

x1 = -0.5402

x2 = -1.7639

x3 = 1.4657

upon doing all the 3rd iteartion we get,

x1 = -0.5962

x2 = 0.2747

x3 = 0.6021

so option E is correct