

Mid Assessment, Fall-2022

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CSE, 21st Batch

Numerical Methods

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Course code - MAT 415

Ans. to the Q. no-6

i) Converting the binary to decimal -

$$\text{Q. 11} \quad (0111.0111)_2 = 0 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 + 0 \times 2^{-1} \\ + 1 \times 2^{-2} + 1 \times 2^{-3} + 1 \times 2^{-4}$$

$$= 0 + 4 + 2 + 1 + 0 + 1/4 + 1/8 + 1/16$$

$$= 4 + 2 + 1 + 0.25 + 0.125 + 0.0625$$

$$= (7.4375)_{10}$$

Ans.

ii) Converting the hexadecimal to decimal number -

$$(F2C.A)_{16} = F \times 16^2 + 2 \times 16^1 + C \times 16^0 + A \times 16^{-1}$$

$$= 15 \times 256 + 2 \times 16 + 12 \times 1 + 10 + 1/16$$

$$= 3840 + 32 + 12 + 0.625$$

$$= (3884.625)_{10}$$

Ans.

Ans. to the Q. no-03

Find the root of the equation $x^4 - x - 10 = 0$ using bisection Method :-

The function is $F(x) = x^4 - x - 10$

At $x = -1.00$ $F(x)$ is equal to -8.00

At $x = -2.00$ $F(x)$ is equal to 8.00

Intuitively we feel, and justly so that since $F(x)$ is negative on one side of the interval, and positive on the other side then, somewhere inside this interval, $F(x)$ is zero.

$$x = -1.697471857$$

Ans.

— 0 —

Ans to the Q. no - 1

Given

$$x = 8/9 = 0.8889 \text{ and } \bar{x} = 0.8889$$

f (a) then the absolute error is

$$\begin{aligned} \text{Abs. error} &= (0.8889 - 0.8889) \\ &= 9 \times 10^{-5} \quad \underline{\underline{\text{Ans.}}} \end{aligned}$$

(b) Relative error is

$$\text{Rel. error} = \frac{9 \times 10^{-5}}{0.8889} = 10.1248 \times 10^{-5} \quad \underline{\underline{\text{Ans.}}}$$

Ans to the Q. no - 4

$$f(2) = -9, f(3) = 6$$

root lines between 2 and 3

$$a = 2; f(a) = -9$$

$$b = 3; f(b) = 6$$

Substituting the values in the formula

$$x = \frac{b f(a) - a f(b)}{f(a) - f(b)}$$

$$\text{we get } x_1 = \frac{3(-9) - 2(6)}{-9 - 6} = 2.6; f(x_1) = -1.824$$

Therefore x_1 becomes 'a' to find the next point

$$x_2 = \frac{3(-1.824) - (2.6(6))}{-1.824 - 6} = 2.693251534$$

$$f(x_2) = -0.23722651$$

Therefore x_2 becomes a to find the next point

$$x_3 = \frac{3(-0.23722651) - 2.693251534(6)}{-0.23722651 - 6}$$

$$= 2.704918397; \quad f(x_3) = -0.028912179$$

Therefore, the positive root corrected ~~for~~ to

2 decimal place is 2.7049

Aws.