1 Manual Solutions

1.1 Bisection Method

Bisection Method

$$\mathbf{f(X) = X^3 - X - 2 = 0}$$

f(X) = $\boldsymbol{X^3 - X - 2}$ = 0 interval [1,2] =

$$f(X) = X^3 - X - 2 = \mathbf{0}$$

$$f(1) = 1^3 - 1 - 2$$

$$= \underline{-2} \qquad \mathbf{F(1) < 0}$$

$$f(2) = 2^3 - 2 - 2$$

$$= \underline{4} \qquad \mathbf{F(2) > 0}$$

Since f(1)<0. f(2) > 0; a root exists between 1 and 2

$$\mathbf{C} = \left(\frac{1+2}{2}\right)$$

$$= \underline{1.5}$$

$$f(1.5) = 1.5^3 - 1.5 - 2$$

$$= \underline{-0.125}$$

therefore, updated Interval [1.5,2]

Table 1:Iteration Table.

Iterations	a	F(a)	b	F(b)	c	F(c)	update
1	1.00000000	-2.00000000	2.00000000	4.00000000	1.50000000	-0.12500000	a=c
2	1.50000000	-0.12500000	2.00000000	4.00000000	1.75000000	1.60937500	b=c
3	1.50000000	-0.12500000	1.75000000	1.60937500	1.62500000	0.66601562	b=c
4	1.50000000	-0.12500000	1.62500000	0.66601562	1.56250000	0.25219727	b=c
5	1.50000000	-0.12500000	1.56250000	0.25219727	1.53125000	0.05911255	b=c

So **1.53125000** considered as a **root** according to Bisection Method after 5 iterations