8. Find the real root of equation $x^3 - 18 = 0$ upto correct upto three decimal places using bisection method.

1) Sol^n given

$$x^3 - 18 = 0$$

$$\therefore f(x) = 0$$

$$x^3 - 18 = 0$$

find a, b value

$f(0) = -18$

$f(1) = -17$

$f(2) = -10$

$f(3) = 9$

$f(2.5) = 15.625 - 18 = -2.375$

$f(2.6) = (2.6)^3 - 18 = 17.576 - 18 = -0.424$

$f(2.7) = (2.7)^3 - 18 = 19.683 - 18 = 1.683$

∴ Root lies bet^n $a = 2.6$ and $b = 2.7$

1st approximate root

$$x_0 = \frac{a+b}{2} = \frac{2.6 + 2.7}{2} = 2.65$$

$f(2.65) = (2.65)^3 - 18$
$\quad = 18.6096 - 18$
$\quad = +.6096$

∴ ∴ Root lies bet^n 2.6 and 2.65

2nd Approximate value

$$x_1 = \frac{a + x_0}{2} = \frac{2.6 + 2.65}{2} = 2.625$$

$f(2.625) = (2.625)^3 - 18 = 18.0878 - 18 = + 0.0878$

∴ Root lies bet^n $a = 2.6$ and $x_1 = \overset{2.625}{\cancel{0.0878}}$.

3rd approximate root

$$x_2 = \frac{a + x_1}{2} = \frac{2.6 + 2.625}{2} = 2.6125$$

∴ $f(2.6125) = (2.6125)^3 - 18 = 17.83072 - 18 = -0.1692$

∴ Root lies bet^n 2.6125 and 2.625

4th approximate sol.

$$x_3 = \frac{x_2 + x_1}{2} = \frac{2.6125 + 2.625}{2} = 2.61875$$

$f(2.61875)^{} = (2.61875)^3 - 18 = 17.9589 - 18 = -0.041 < 0$

∴ Root lies bet^n $x_1 = 2.625 =$ and $x_3 = 2.61875$

5th approximate Root

∴ $x_4 = \dfrac{x_1 + x_3}{2} = \dfrac{2.625 + 2.61875}{2}$

$= 2.621875$

$f(2.621875) = (2.621875)^3 - 18$

$= 18.023367 - 18$

$= 0.02336 > 0$

∴ Root lies bet^n 2.61875 and 2.621875

6th approximate Root.

$x_5 = \dfrac{x_4 + x_3}{2} = \dfrac{2.61875 + 2.621875}{2}$

$$\boxed{\alpha = 2.620}$$

.2

n	a	b	x	f(x)
1	2.6	2.7	2.65	0.6096
2	2.6	2.65	2.625	0.0878
3	2.6	2.625	2.6125	−0.1692
4	2.6125	2.625	2.61875	−0.041
5.	2.61875	2.625	2.621875	0.02336
6.	2.61875	2.621875	2.620	−