Ans 1

(a)

(1) $Max = (0.\underbrace{1111}_{m=4})_2 \times 2^4$

$Min = (0.\underbrace{1000}_{m=4})_2 \times 2^{-3}$

(2)

$Max = (1.\underbrace{1111}_{m=4})_2 \times 2^4$

$Min = (1.\underbrace{0000}_{m=4})_2 \times 2^{-3}$

(3) $Max = (0.1\underbrace{1111}_{m=4})_2 \times 2^4$

$Min = (0.1\underbrace{0000}_{m=4})_2 \times 2^{-3}$

(b)

(1) $e_1 num = \begin{bmatrix} -3 \\ -2 \\ -1 \\ 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} = 8$

(1)

$$2^{m-1} \times e^{num}$$
$$= 2^{4-1} \times 8$$
$$= 2^{3} \times 8$$

(2)

$$2^{m} \times e^{num}$$
$$= 2^{4} \times 8$$

(3)

$$2^{m} \times e^{num}$$
$$= 2^{4} \times 8$$

(c) (1)

$$Max = +(0.1111)_2 \times 2^{4}$$
$$Min = -(0.1111)_2 \times 2^{4}$$

(2)

$$Max = +(1.1111)_2 \times 2^{4}$$
$$Min = -(1.1111)_2 \times 2^{4}$$

CamScanner

(3) Max $= +(0.\ 11111)_2 \times 2^4$

Min $= -(0.11111) \times 2^4$

(d) Take the values from (b) and multiply by 2.

(e)

(1)

$$(0.1\_\ \_\ \_)_2 \times 2^{-2}$$

$(0.1000)_2 \times 2^{-2}$

$(0.1001)_2 \times 2^{-2}$

$(0.1010)_2 \times 2^{-2}$ Equall

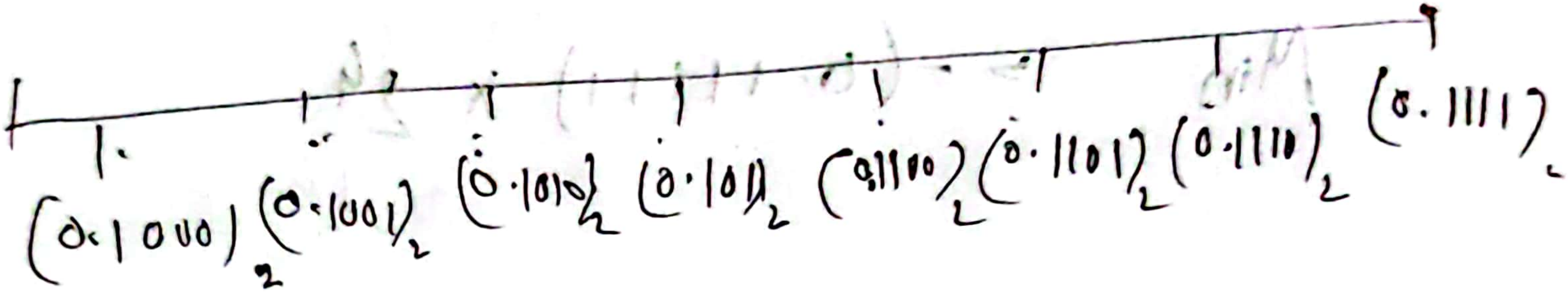
$(0.1011)_2 \times 2^{-2}$

$(0.1100)_2 \times 2^{-2}$

$(0.1101)_2 \times 2^{-2}$

$(0.1110)_2 \times 2^{-2}$

$(0.1111)_2 \times 2^{-2}$



Equally spared shown.

(3) $x^2 - 16x + 5 = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-16) \pm \sqrt{(-16)^2 - 4\cdot 1\cdot 5}}{2\times 1}$$

$$= 8 \pm \frac{\sqrt{236}}{2} = 8 \pm \sqrt{59}$$

$$\cancel{x_1 = 8 + \sqrt{236} = 23.362}$$

$$\cancel{x_2 = 8 - \sqrt{236} = -7.3623}$$

$$\cancel{\sqrt{236} = 15.362}$$

$$x_1 = 8 + \sqrt{59} = 15.681$$

$$x_2 = 8 - \sqrt{59} = 0.31885$$

Let's say our computer can go upto 5 s.f

$$\sqrt{59} = 7.6811$$

same

$$x_1 = 8 + 7.6811 = 15.681\cancel{1}$$

$$x_2 = 8 - 7.6811 = 0.3189$$

Subtracting two close numbers results in loss of significance.

Solution

~~$x^2 - 56x +$~~

$x^2 - 16x + 5 = 0$

α, β are roots

$x^2 - (\alpha + \beta)x + \alpha\beta$

$\alpha\beta = 5$

find α, using $8 + 7.6811$.

$\alpha = 15.681$

$\alpha\beta = 5$

~~55.98~~

$\Rightarrow 15.681 \times \beta = 5$

$\Rightarrow \beta = \frac{5}{15.681} = 0.31885$ (same as actual x_2)