1] Smallest number $= (1.00)_2 \times 2^0$
Largest number $= (1.11)_2 \times 2^7$
} non-negative

Smallest number $= -(1.11)_2 \times 2^7$
Largest number $= (1.11)_2 \times 2^7$
} negative support

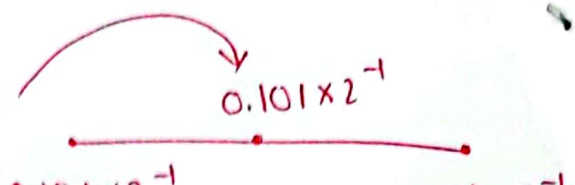
2] $\frac{1}{2} \times \beta^{-m} = \frac{1}{2} \times 2^{-5}$

3] Standard convention, $(0.1d_2d_3d_4)_2 \times 2^e$
for each value of e, we get $2^3 = 8$ values.
∴ for 7 values of e, we get $8 \times 7 = 56$ ∎

N.B. 112 is also acceptable if negative-support is not clearly mentioned.

4] $y = 5/16 = 4/16 + 1/16 = 0.0101$

$= 0.101 \times 2^{-1}$



$\text{mid} = \frac{\frac{1}{4} + \frac{3}{8}}{2} = \frac{2+3}{8\times 2} = \frac{5}{16}$

$= \frac{4}{16} + \frac{1}{16}$

$= 0.0101$

$= 0.101 \times 2^{-1}$

$0.10 \times 2^{-1} = \frac{1}{2} \times 2^{-1} = \frac{1}{4}$

$0.11 \times 2^{-1} = \left(\frac{1}{2} + \frac{1}{4}\right) \times 2^{-1} = \frac{3}{4} \times \frac{1}{2} = \frac{3}{8}$

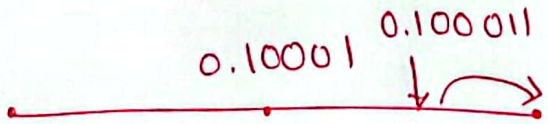
Since at middle, it will be rounded to even number

$\therefore fl(xy) = 0.10 \times 2^{-1}$

5] $x = 5/8 = 4/8 + 1/8 = 0.101$ [No rounding needed]

$y = 7/8 = 4/8 + 2/8 + 1/8 = 0.111$ [No rounding needed]

$xy = 5/8 \times 7/8 = 35/64 = 32/64 + 2/64 + 1/64 = (0.100011)_2$



$0.1000 = 1/2$

$0.1001 = 1/2 + 1/16 = 9/16$

mid

$= \frac{\frac{1}{2} + \frac{9}{16}}{2} = \frac{8+9}{16\times 2} = \frac{17}{32} = \frac{16}{32} + \frac{1}{32} = (0.10001)_2$

$\therefore fl(xy) = (0.1000)_2 \times 2^0 = 9/16$

So rounding error $= \left(9/16 - 35/64\right) = 1/64$