Tutorial 1 of 3SK3

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Question 1

Which of these are representable machine numbers in standard IEEE 32–bit binary format:

(a) \(-1.01 \times 10^{200}\), (b) 127.00125, (c) 1/127,

(d) \(2.625 \times 2^{-58}\), (e) \(1.0 \times 10^{-32} + 2.625 \times 10^{-125}\)
$U = m \cdot b^c = (2 - 2^{-23}) \times 2^{127} \approx 3.4028 \times 10^{38}$

$L = m \cdot b^c = 1 \times 2^{-126} = 1.1755 \times 10^{-38}$
Question 1

- Only the numbers between \(-U\) and \(-L\), 0 and between \(L\) and \(U\) can be represented.

Figure 13: Range of exactly representable numbers
Question 2

Evaluate $e^{-8.3}$ using two approaches

$$e^{-x} = 1 - x + \frac{x^2}{2} - \frac{x^3}{3!} + \cdots$$

and

$$e^{-x} = \frac{1}{e^x} = \frac{1}{1 + x + \frac{x^2}{2} + \frac{x^3}{3!} + \cdots}$$

and compare with the true value of $2.485168 \times 10^{-4}$

and discuss your results. Use 25 terms to evaluate each series.
Thank you