# 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) $1.0 \times 10^{-32} + 2.625 \times 10^{-125}$

# Question 1

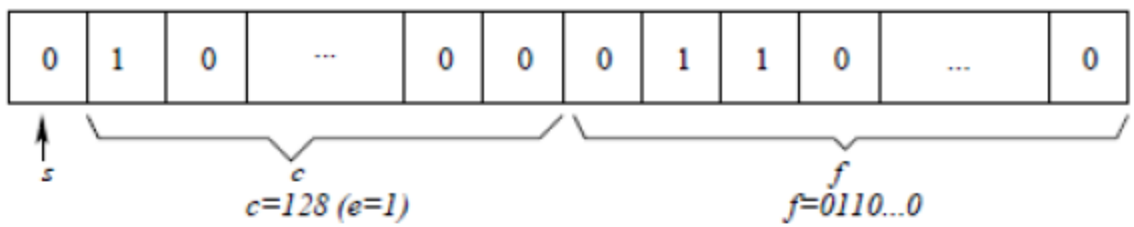


Figure 12: IEEE 32-bit floating point representation of 2.75

$$U = m \cdot b^e = (2 - 2^{-23}) \times 2^{127} \approx 3.4028 \times 10^{38}$$

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

# Question 1

- Only the numbers between −U and −L, 0 and between L and U can be represented

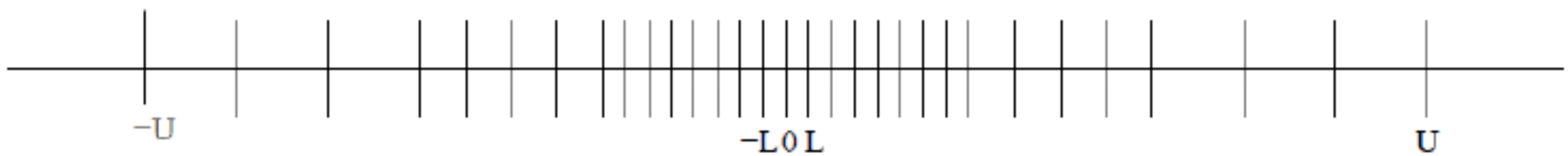


Figure 13: Range of exactly representable numbers

# 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