1. Suppose we have a computer that uses (single-precision) IEEE Standard floating point arithmetic: 24 digits to represent the mantissa, and exponents in the range \([-126, 127]\).

(a) Consider evaluating the expression \(c = a \times b\) on this machine. Give a machine-representable (finite) value for \(a\) and a machine-representable (finite) value for \(b\) for which the computed value \(c=\text{INF}\) because of overflow.

(b) What is the distance between \(2^{20}\) and the next larger floating point number?

2. If we type \(\cos(\pi/2)\) in MATLAB, the computed answer is \(6.1232\times10^{-17}\). Why doesn’t MATLAB return the correct value, 0?

3. Let \(A\) be an \(m \times n\) matrix, and define

\[
\|A\|_\infty = \max_i \sum_{j=1}^{n} |a_{ij}|
\]

Write an efficient column-oriented algorithm to compute \(\|A\|_\infty\). (Don’t use any MATLAB function calls except abs and max.)

Note: In practice, for maximal efficiency, we would just say \(\text{normA} = \text{norm}(A, \infty)\) to access a column-oriented algorithm.