COMP 5812M: Foundations of Modeling & Rendering 2018-2019

Induction Week Lab - Calculus & Linear Algebra

1. For each of the following functions, find the derivative:

2. For each of the functions in 1., find the indefinite integral (if possible) and evaluate the definite integral from -1 to +1.

3. Given three points:

three vectors:

and three matrices:

Find:

Are independent? Use them to construct an orthonormal basis.

4. Differentiate the following parametric functions and explain the geometric meaning of both the function and the derivatives. Where relevant, sketch the functions for clarity.

, where and

5. Write a small command-line program in C/C++ with a function myExp(x) which computes .

* 1. Test your function by comparing it with the function in the math library. How accurate is it? Test it against every integer x from -100 to +100.
  2. Call your function and the library function at least 1,000,000 times for each integer value, and see which one is faster, using the time utility or sys/time calls.
  3. Pre-compute all the values, store them in a lookup table, then compare the speed of this lookup table with your other versions.