Numerics Practice Problems

1. Decide whether these statements are True or False. You must briefly justify all your answers to receive full credit.

   (a) Multiplication of two \(d\)-digit integers can be performed in time \(O(d^{1.01})\).

   (b) It would be feasible, using the program demonstrated in class for computing to milllionth digit of \(\sqrt{2}\), to compute the ten-millionth digit of \(\sqrt{2}\) within a class period.

   (c) Newton’s Method can be used to compute a zero for any continuous function.

   (d) Karatsuba’s method for multiplying integers is an example of the “Divide-and-Conquer” paradigm.

2. When computing \(\sqrt{2}\) using Newton’s Method, some values of \(x_0\) (the “initial guess”) cause Newton’s Method not to converge to the desired value. Give an example of one such “bad initial guess”, and explain why it is “bad”.