Missouri University of Science & Technology — Department of Computer Science
Spring 2024 — **CS 2500: Algorithms (Sec: 102)**

Homework 1: Foundations

Instructor: *Sid Nadendla* — **Due:** *February 9, 2024*

Problem 1 Karatsuba's Integer Multiplication *2 points*

Problem 1.8 (Ref. Page 26 in the textbook.)

Note: The problem is labeled as Problem 1.6 in the 2017 edition of the same book, as well as on the book's website under Test Cases and Data Sets for Programming Projects.

Problem 2 Empirical Run-Time Analysis *2 points*

Perform empirical run-time analysis on Karatsuba's algorithm and compare your findings with the theoretical runtime analysis carried out in the class.

Ref. Recitation lecture for empirical run-time analysis on Feb 2, 2024.

Problem 3 Asymptotic Notation *2 points*

Problem 2.4 (Ref. Page 43 in the textbook.)

Problem 4 Divide and Conquer *2 points*

Problem 3.4 (Ref. Page 69 in the textbook).

Problem 5 Master Method *2 points*

Problem 4.3 (Ref. Page 88 in the textbook).

Problem 6 Extra credit *1 point*

Problem 4.7 (Ref. Page 89 in the textbook.)