Introduction to Computer Science
E15 – Discussion Sections (1) – Week 45

1. Hashing: Write a program (in either Python or Java) to compute the probability of at least one collision when hashing is used with m records and n buckets. (See the calculation on page 445 of your textbook and generalize it.) Assume that the the hash function spreads data out essentially randomly. Use your program to answer problem 7 on page 446 and problem 57 on page 454. How did you use your program?

2. Hashing: Do problem 6 on page 446. Explain how a poorly chosen hash function can result in a hash storage system becoming little more than a sequential file.

3. Turing machines: Questions 3 and 5 on page 546. For 5, define a Turing machine which halts if it reads a zero and loops if it reads a 1.

4. Turing machines: Problems 14 on page 554

5. Design a Turning machine that reverses the pattern of 0s and 1s that it finds between the current cell (which contains an asteris) and the first asteris to the left. Can you come up with more than one way to do it? (Note that reverse puts the first bit at the end, the second bit next to the end, etc., so 110 becomes 011, for example.)