Homework 7
(due Tuesday, November 10)

Instructions: This homework is a **programming assignment** to be submitted as **tint programs** on GradeScope by 11:59 pm on the due date. Instructions will be posted on Piazza.

Please note that all Turing machines in this assignment are of the *standard one-way* kind. Do not submit a two-way machine.

Do not underestimate the time this assignment will take.

Read: 3.1, 3.2 (for this homework and for Tuesday's class)

---

1. [10 Points] Define a Turing machine with input alphabet $\{a, b, c\}$ that decides

$$\{a^i b^j c^k \mid 0 < i < j < k\}$$

2. [10 Points] Define a Turing machine with input alphabet $\{a, b, c\}$ that decides

$$\{a^i b^j c^k \mid i, j, k \geq 0 \text{ and } i + j = k\}$$

3. [10 Points] Define a Turing machine with input alphabet $\{a, b\}$ that decides

$$\{a^n b^{n^2} \mid n > 0\}$$

   (Hint: This might be easier after you've written the next two programs.)

4. [10 Points] Define a Turing machine with input alphabet $\{a, b, c\}$ that decides

$$\{w\, c\, w \mid w \in \{a, b\}^*\}$$

5. [10 Points] Define a Turing machine with input alphabet $\{a, b\}$ that decides

$$\{w \in \{a, b\}^* \mid w = w^R\}$$