1. [15 pts] Let $L$ be the set of palindromes over $\{a, b\}$. Build a two-tape Turing machine that accepts $L$ in which the computation with input $u$ should take no more than $3 \times \text{length}(u) + 4$ transitions (Problem 8.14(b) on Page 291).

2. [15 pts] Construct a 2-tape NTM, which cannot be a deterministic TM, that accepts $L = \{uu \mid u \in \{a, b\}^*\}$ (Problem 8.21, Page 292).

3. [20 pts] Construct a Turing machine that computes the product of two numbers $m$ and $n$, where $m, n \geq 0$. $m$ ($n$, respectively) is represented by $m$ ($n$, respectively) number of ‘1’s on the input tape, and each number is followed by a ‘0’, i.e., $B1^m01^n0B$. 