
The answers must be the original work of the author. While discussion with others is permitted and encouraged, the final work should be done individually. You are not allowed to work in groups. You are allowed to build on the material supplied in the class. Any other source must be specified clearly.

1. (60 points) Construct TMs that accept the following languages. Write the high-level algorithm executed by the machine.

- a.** The set of strings over $\{a, b, c\}$ that begin with a , contain exactly two bs , and end with cc .
- b.** $\{a^i b^j c^k \mid i + j = k\}$
- c.** $\{ww \mid w \in \{a, b\}^*\}$

2. (10 points) Convert 1362_{10} to binary using two different methods. Show your work.

3. (10 points) Convert 0.3_{10} to binary. Show the result in 4 bits of precision and 16 bits of precision for the decimal part.

4. (10 points) Create your own example where the associative law fails due to limited precision.

5. (10 points) Create your own example where the distributive law fails due to limited precision.