Reading. Read Chapter 9: “Turing Machines” and Chapter 10: “Other Models of Turing machines.” There are several pre-recorded lectures pertaining to this assignment. They can be found following the links on the grid of notes, or on Canvas under “Panoto Recording.”

Assignment. Do some small number of the following exercises.

- Section 9.1: Problems 1, 2, 3, 4, 5, 6, 7, 8abcdefg
- Section 10.1: Problems 1, 2, 3a, 4, 5, 6
- Section 10.2: Problems 1abcdef
- Section 10.3: Problems 2abcdef
- Section 10.4: Problems 1, 2

Submission. Write up the solutions. You may use pen and paper, plain text, or \LaTeX. Produce a PDF document, and submit it on Canvas by the due date before the end of the day.

The due date is for the completed problem set. You should read the material in advance, and start thinking and working on the problems in advance, so that you can ask questions in class.

Collaborating is encouraged; no individual grade for the homework will be used in determined the individual course grade (that’s what the tests are for). Copying just wastes everyone’s time; it is quality that is important not quantity. Copying is not practicing. Of course, some individual may require much more practice than others to achieve the same level of competency on the tests.

Questions. If you have questions about how to do the problems, you are welcome to send me e-mail: ryan@fit.edu. Students may be called upon to share and explain their progress on the exercises during class.

Assessment. Ultimately the written proofs, your choice of exercises, and your participation in answering and asking questions, will influence your course grade.
Objectives.

1. Know the standard Turing machine model
2. Perform the steps of a Turing machine given a sample input string
3. Determine whether an input string is accepted by a Turing machine
4. Construct a Turing machine to accept a specific language
5. (§9.3) State Turing's thesis and understand the arguments for it
6. (§10.1) Explain the concept of equivalence between classes of automata
7. (§10.1) Describe how a Turing machine with a stay-option can be simulated by a standard Turing machine
8. (§10.1) Describe how a standard Turing machine can be simulated by a machine with a semi-infinite tape
9. (§10.1) Compare multi-track Turing machines with standard Turing machines
10. (§10.2) Describe how multi-tape, and multidimensional Turing machines can be simulated by standard Turing machines
11. (§10.3) Describe the operation of nondeterministic Turing machines and their relationship to deterministic Turing machines. Thm 10.2: TM = nondeterministic TM
12. (§10.4) Describe the components of a universal Turing machine
13. (§10.4) Define countable sets (page 278)
14. (§10.4) Define enumeration by a Turing machine (Def 10.4)
15. Describe encoding and decoding tuples, lists, strings, and Turing machine
16. (§10.5) Describe the operation of linear bounded automata and their relationship to TMs. [CSLs defined by grammars in §11.3, Def 11.5, page 300.]