

FYSE 1280    Fall 2025  
*Breaking The Code: The Enigma of Alan Turing*  
**Assignment 20**  
 For Monday, November 3



*Reading*

Read Sections 1 – 5 (Pages 443 – 442) of Turing’s paper “Computing Machinery and Intelligence”

*Writing*

Continue work investigating responses to Turing’s “Computing Machinery and Intelligence Paper” in *Mind*

*Problem On Turing Machines*

Due Monday, November 5

Your job is to describe a Turing Machine that doubles positive integers. The input will be a positive whole number in unary form. The first part of the assignment is to write a clear verbal explanation of how your machine will work. There are several different approaches to carrying out the doubling task. Do not worry at this stage about the number of states and the exact description of the transition functions.

Due Friday, November 7

Create a Turing Machine that doubles numbers. Assume the number is a positive integer represented in unary form. For example, the input tape for 3 would look like

|  |  |   |   |   |   |   |  |
|--|--|---|---|---|---|---|--|
|  |  | # | 1 | 1 | 1 | # |  |
|--|--|---|---|---|---|---|--|

and we want the output tape to look like

|  |  |   |   |   |   |   |   |   |   |  |   |
|--|--|---|---|---|---|---|---|---|---|--|---|
|  |  | # | 1 | 1 | 1 | 1 | 1 | 1 | # |  | y |
|--|--|---|---|---|---|---|---|---|---|--|---|

List all the states and provide a careful description of all the transition functions you will use. Show step by step what the tape will look like and over which square on the tape the read/write head is pointing. Make sure that your Turing Machine works if the positive integer is 1 and also for any positive integer of your choice larger than 2.