MAU11602 first quiz, week 2
Thu 11/02/21 due 11am Friday 19/02/21

Rules and procedures.
1. Attempt 3 questions. Only *your first three answers* will be marked. **2.** Each question carries 20 marks, so the maximum quiz mark is 60. **3.** If a particular method of solution is stipulated, you get no marks if you don't use it. **4.** ***Show all work.*** No marks will be given for answers which do not show the calculations. **5.** Your answers should be scanned and submitted to Blackboard.

All turing machines must conform to the pattern required for the turinginC program. Also, if and when a machine terminates, the square being scanned should contain the leftmost nonblank tape symbol (blank if the tape is blank).

Question 1. There is a machine for incrementing binary strings on the web page. Modify it so that it loops on empty input.

Question 2. Present a Turing machine which, on input x (a bitstring), halts with $|x| \mod 2$ (0/1) on the tape.

Question 3. Present a Turing machine which halts with empty tape if the input x has the same number of occurrences of 0 as of 1, and loops otherwise.

Question 4 Present a Turing machine which on input x halts with x^R on the tape, where x^R is the reversal of x.

Question 5. Prove that if u, v, x, y are bitstrings and u, v are valid encodings of Turing machines and $ux = vy$, then $u = v$ and $x = y$.