Directions: **Work only on this sheet** (on both sides, if needed). MAKE SURE TO COPY YOUR ANSWERS TO A SEPARATE SHEET FOR SENDING ME AN ELECTRONIC COPY LATER.

**Important note:** Remember that in problems calling for R code, you are allowed to use any built-in R function, e.g. `choose()`, `sum()`, etc.

1. This problem deals with the ALOHA simulation example on p.23.

   (a) (20) What variable in the program is analogous with the number of lines in our "notebook" view?

   (b) (20) Suppose we want to add code to find $P(\text{collision during epoch 2})$. We'll set a variable `ce2` to 0 early in the code, and near the end, we'll divide it by `nreps`. We'll need to add one more line of code. State the line number after which the new line is to be inserted, and state what code goes there. Sample answer:

   ```r
   after line 10 insert "if (x == 0) y <- 3"
   ```

2. This problem involves the bus ridership example in Section 2.11.

   (a) (20) Find the probability that no passengers board the bus at the first three stops.

   (b) (20) Suppose it is observed that the bus arrives empty at the third stop. What is the probability that exactly two people boarded the bus at the first stop?

   (c) (20) Suppose we wish to find $E(L_2)$ via simulation, by modifying the program on p.24. Say we initialize to 0 a variable named `tl2` near the beginning of the program, and will divide it by `nreps` near the end of the code. State the line number after which the new line is to be inserted, and state what code goes there.

Solutions:

1.a `nreps`

1.b After line 29, insert

   ```r
   if (numsend == 2) ce2 <- ce2 + 1
   ```

2.a $0.5^3$

2.b The event of the bus arriving empty at stop 3 is the same as $L_2 = 0$. Then we have:

   $P(B_1 = 2|L_2 = 0) = \frac{P(B_1 = 2 \text{ and } L_2 = 0)}{P(L_2 = 0)}$ (1)

   $= 0.1 \times 0.2^2 \times 0.5/0.292$ (2)