This problem set covers material from Week 2, dates 9/19- 9/22. Unless otherwise noted, all problems are taken from the textbook. Problems can be found at the end of the corresponding chapter. "AP" stands for additional problems not found in the book.

Instructions: Write or type complete solutions to the following problems and submit answers to the corresponding Canvas assignment. Your solutions should be neatly-written, show all work and computations, include figures or graphs where appropriate, and include some written explanation of your method or process (enough that I can understand your reasoning without having to guess or make assumptions). A general rubric for homework problems appears on the final page of this assignment.

Tuesday 9/19

- **AP 1**: The classic birthday problem asks: in a room of k people, what is the probability that at least two people share the same birthday (assuming no leap year, no twins, and all days equally likely).

  a) What is the theoretical probability that in our classroom of 22 people (Prof. Tang included), at least one person has the same birthday as you? Verify your answer using simulation in `R`.

  b) How does this compare to the probability of at least one match in the usual birthday problem? Explain intuitively why this difference might be.

- **AP 2**: Suppose each of 10 balls is independently placed into one of 10 boxes at random, with all boxes equally likely. Write a program in `R` to estimate the probability that *exactly one* box is empty. *Hint: it may be useful to use the* `unique()` *function, which returns the subset of unique entries of a vector, along with the* `length()` *function, which returns the length of a vector.*

Thursday 9/21

- To be announced.

Friday 9/22

- To be announced.

General rubric

Points	Criteria
5	The solution is correct *and* well-written. The author leaves no doubt as to why the solution is valid.
4.5	The solution is well-written, and is correct except for some minor arithmetic or calculation mistake.
4	The solution is technically correct, but author has omitted some key justification for why the solution is valid. Alternatively, the solution is well-written, but is missing a small, but essential component.
3	The solution is well-written, but either overlooks a significant component of the problem or makes a significant mistake. Alternatively, in a multi-part problem, a majority of the solutions are correct and well-written, but one part is missing or is significantly incorrect.
2	The solution is either correct but not adequately written, or it is adequately written but overlooks a significant component of the problem or makes a significant mistake.
1	The solution is rudimentary, but contains some relevant ideas. Alternatively, the solution briefly indicates the correct answer, but provides no further justification.
0	Either the solution is missing entirely, or the author makes no non-trivial progress toward a solution (i.e. just writes the statement of the problem and/or restates given information).
Notes:	For problems with multiple parts, the score represents a holistic review of the entire problem. Additionally, half-points may be used if the solution falls between two point values above.
Notes:	For problems with code, well-written means only having lines of code that are necessary to solving the problem, as well as presenting the solution for the reader to easily see. It might also be worth adding comments to your code.