Name: _____

MATH 308
Fall 2021
HW 17: Due 12/10

"The most likely way for the world to be destroyed, most experts agree, is by accident. That's where we come in; we're computer professionals. We cause accidents."

–Nathaniel Borenstein

Problem 1. (10pt) The Unicode family of character encodings uses a binary string of n bits to represent characters. Suppose that it is necessary to encode at least 100,000 distinct characters. What is the smallest possible value of n that will suffice?

Problem 2. (10pt) A ice cream shop offers 13 different toppings. If a customer orders their favorite flavor of ice cream, how many possible combinations of toppings can they choose between none and three different toppings?

Problem 3. (10pt) How many nonnegative integer solutions are there to the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 50$? What if the nonnegative restriction was removed?

Problem 4. (10pt) How many 4-element subsets of $\{1, 2, 3, \ldots, 9, 10\}$ are there? Generalize this to the number of k-element subsets of $\{1, 2, \ldots, n\}$. You need not prove your generalization.

Problem 5. (10pt) Suppose you have 100 people in an organization. You need to form an oversight committee consisting of 7 people that has a designated president and vice president. How many different committees can be formed?