Due Date: Thursday, September 1 at 5PM EDT

Carefully read and provide solutions to the problems below, showing all work required to justify any conclusions you make. You are encouraged to collaborate with your classmates, but all solutions turned in should be your own work. If you do collaborate, please record the names of those other students on your submitted work. Finally, your work should be submitted as a PDF on Gradescope before the listed due date.

Textbook problems: 1.3, 2.2

Problem 1. For each of the lists of numbers, (a) find the next three numbers and (b) find a formula for the nth term in the sequence. Describe the sequence in plain English too, if possible.

(a) $7, 14, 21, 28, 35, \ldots$

(b) $1, 4, 7, 10, 13, \ldots$

(c) $1, 8, 27, 64, 125, \ldots$

(d) $2, 4, 8, 16, 32, 64, \ldots$

(e) $11, 20, 29, 38, 47, \ldots$

Problem 2. A natural number is called **perfect** if it is equal to the sum of its divisors. For example, $6 = 1 + 2 + 3$ so 6 is a perfect number. Find the next perfect number after 6 on your own, then look up the next few perfect numbers after that. Is there a general pattern to these numbers?