Discrete Structures **Homework 4** **Oct 3**

Include your name, the homework number, and your complete work, including any steps used to obtain the answer. Submit a hard copy - written out legibly or printed - before class.

Section 1.7 **(*20 pts*)**

6. Use a direct proof to show that the product of two odd numbers is odd. (2 pt)

12. Prove or disprove that the product of a nonzero rational number and an irrational number is irrational. (2 pt)

18. Prove that if n is an integer and $3n+2$ is even, then n is even using (4 pt)
a) a proof by contraposition.
b) a proof by contradiction.

24. Show that at least three of any 25 days chosen must fall in the same month of the year. (2 pt)

26. Prove that if n is a positive integer, then n is even **if and only if** $7n + 4$ is even. (2 pt)

Section 1.8

4. Use a proof by cases to show that $min(a, min(b, c)) = min(min(a, b), c)$ whenever a, b, and c are real numbers. (2 pt)

6. Prove using the notion of without loss of generality that $5x + 5y$ is an odd integer when x and y are integers of opposite parity. (2 pt)

8. Prove that there is a positive integer that equals the sum of the positive integers not exceeding it. Is your proof constructive or nonconstructive? (2 pt)

16. Show that if a, b, and c are real numbers and $a \neq 0$, then there is a unique solution of the equation $ax + b = c$. (2 pt)