

**Math 2002 Number Systems  
Homework Set 1**

**Spring 2023**

**Course Instructor:** Dr. Markus Pflaum

**Contact Info:** Office: Math 255, Telephone: 2-7717, e-mail: markus.pflaum@colorado.edu.

**Problem 1:** Using truth tables determine which ones of the following propositional formulas is a tautology:

a)  $(A \implies B) \iff (\neg A \vee B)$

b)  $(A \wedge B) \vee (\neg A \vee \neg B)$

c)  $(A \vee B) \implies (A \wedge B)$

d)  $(A \wedge B) \implies (A \vee B)$

(8P)

**Problem 2:** For each of the following statements, formulate a logically equivalent one using only  $A$ ,  $B$ ,  $\neg$  and  $\vee$ . You may use as many parentheses as you need. Use a truth table or rules of mathematical logic to verify your claim.

a)  $A \implies \neg B$

b)  $\neg A \wedge \neg B$

c)  $A \iff \neg B$

(6P)

**Problem 3:** For each of the following sentences formulate an English sentence that is its negation:

a) If you study hard you will do well in school.

b) I will pay my taxes and avoid going to jail.

c) Horses eat oates or horses eat hay.

(6P)