

**TMA4140**  
**DISKRET MATEMATIKK – DISCRETE MATHEMATICS**  
**NTNU, HØST/FALL2020**

EXERCISE SET 10 / ØVING 10

The solutions must be submitted via OVSYS (to the assigned group/TA).  
Løsningene må sendes inn via OVSYS (til den tildelte gruppen/TA).

Deadline for submission: **Friday, 6 November, 1:30pm**  
Innleveringsfrist: **Fredag, 6. november, kl. 13:30**

Textbook: K. H. Rosen, *Discrete Mathematics and Its Applications*, 8. edition

**Exercise/Oppgave**

1. Write down the truth table for  $(p \rightarrow q) \wedge (\neg p \rightarrow r)$ .

**Exercise/Oppgave**

2. Give all steps together with reasons showing that  $(\neg p \vee \neg q) \rightarrow (p \wedge q \wedge r)$  is logically equivalent to  $(p \wedge q)$ .

**Exercise/Oppgave**

3. Use the rules of inference to verify the following argument (give all steps together with reasons)

$$\begin{array}{l} (\neg p \vee q) \rightarrow r \\ r \rightarrow (s \vee t) \\ \neg s \wedge \neg u \\ \neg u \rightarrow \neg t \\ \hline \therefore p \end{array}$$

**Exercise/Oppgave**

4. Let  $\{f_n\}_{n \geq 0}$  be the sequence of Fibonacci numbers. Show that for  $k \geq 0$ ,  $\gcd(f_k, f_{k+1}) = 1$ .

**Exercise/Oppgave**

5. Consider sets  $W, X, Y, Z$  with respect to the universal set  $A$ . Simplify  $(W \cap X) \cup [X \cap ((Y \cap Z) \cup (Y \cap \bar{Z}))]$ . Provide all steps together with justifications from the laws of logic.

**Exercise/Oppgave**

6. *Compute the number of solutions of the pair of equations*

$$\sum_{i=1}^3 a_i - 6 = 0, \quad \sum_{i=1}^5 a_i - 15 = 0, \quad a_i \geq 0, \quad i = 1, 2, 3, 4, 5.$$

**Exercise/Oppgave**

7. Section/Sektion 9.4: *16, 20, 24*

**Exercise/Oppgave**

8. Section/Sektion 9.5: *9, 16*

**Exercise/Oppgave**

9. Section/Sektion 9.6: *9, 18b, 27, 32*

**Exercise/Oppgave**

10. Section/Sektion 10.2: *18, 22, 26a, b, c, 57*