

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

EXERCISE SET 5 / ØVING 5

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: **Wednesday, 30 September, 1:00pm**

Innleveringsfrist: **Onsdag, 30. September, kl. 13:00**

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

**Exercise/Oppgave**

1. A fundamental product of the sets  $A_1, A_2, \dots, A_n$  is defined to be a set of the form  $A_1^{e_1} \cap A_2^{e_2} \cap \dots \cap A_n^{e_n}$ , where  $A_i^{e_i}$  is either the set  $A_i$  or its complement  $\overline{A_i}$ .

i) List all fundamental products of three sets  $A_1, A_2, A_3$

ii) Find the number of fundamental products of  $n$  sets  $A_1, A_2, \dots, A_n$

**Exercise/Oppgave**

2. Show that the function  $h$  is surjective if and only if the following holds: for every two functions  $g_1$  and  $g_2$  with domain of  $g_1$  equal to the domain of  $g_2$  equal to the codomain of  $h$ , the following right cancellation is satisfied: if  $g_1h = g_2h$  then  $g_1 = g_2$ .

**Exercise/Oppgave**

3. Show that the function  $f(n) = 5n^3 + 7n^2 - n + 7 \in O(n^3)$ .

**Exercise/Oppgave**

4. Section/Sektion 4.4: 5b, c, 8, 11a, b, 21, 33, 37a

**Exercise/Oppgave**

5. Section/Sektion 4.5: 12

**Exercise/Oppgave**

6. Section/Sektion 4.6: 26

**Exercise/Oppgave**

7. Section/Sektion 6.1: 27, 46

**Exercise/Oppgave**

8. Section/Sektion 6.2: 13, 18, 20