TMA4140
DISKRET MATEMATIKK – DISCRETE MATHEMATICS
NTNU, HØST/FALL2020

EXERCISE SET 3 / ØVING 3

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: **Monday, 14 September, 1:00pm**
Innleveringsfrist: **Mandag 14. September, kl. 13:00**

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

Exercise/Oppgave
1. *i) What is the negation of* $\exists x \forall y (p(x,y) \to q(x,y))$*?*
ii) Use the laws of logic to show that $\neg(p \vee q) \vee (\neg p \wedge q) \equiv \neg p$

Exercise/Oppgave
2. *Suppose the universal set is* $U = \mathbb{N} = \{1,2,3,4,5,6,\ldots\}$ *and let* $X = \{1,2,3,4\}$ *and* $Y := \{2,3,8,9\}$*. Compute the symmetric difference of* X *and* Y*.*

Exercise/Oppgave
3. *Let* $f : A \to B$ *and* $g : B \to C$ *be two functions. Show that if the composition of the two functions is surjective, then the function* g *is surjective.*

Exercise/Oppgave
4. *Let* c_n *be the sequence defined by the initial values* $c_0 = 1 = c_1$, $c_2 = 3$ *and the recurrence relation*

$$c_{n+2} = 3c_{n+1} - 3c_n + c_{n-1}, \qquad n > 0.$$

Show that for $n \geq 0$, $c_n = n^2 - n + 1$ *is a solution.*

Exercise/Oppgave
5. Section/Sektion 2.6: *27c*

Exercise/Oppgave
6. Section/Sektion 3.1: *57, 59, 60*

Exercise/Oppgave
7. Section/Sektion 3.2: *27a, 27b, 30c, 30e, 34, 42*

Date: September 2, 2020.