NTNU
Institutt for industriell økonomi og teknologiledelse
Vår 2020

Emne TIØ 4126 Optimering og beslutningsstøtte
Øving 4

Utlevering: Torsdag 30.01
Veiledning: Mandag 03.02
Innlevering: Fredag 07.02

Oppgave 1: Modell med innovativ bruk av binær variable

Oppgave 12.3-4 i Hillier and Lieberman 10. utgave (11.3-4 i 9. utgave)
Oppgavetekst:

12.3-4. The Toys-R-4-U Company has developed two new toys for possible inclusion in its product line for the upcoming Christmas season. Setting up the production facilities to begin production would cost \$50,000 for toy 1 and \$80,000 for toy 2. Once these costs are covered, the toys would generate a unit profit of \$10 for toy 1 and \$15 for toy 2.

The company has two factories that are capable of producing these toys. However, to avoid doubling the start-up costs, just one factory would be used, where the choice would be based on maximizing profit. For administrative reasons, the same factory would be used for both new toys if both are produced.

Toy 1 can be produced at the rate of 50 per hour in factory 1 and 40 per hour in factory 2. Toy 2 can be produced at the rate of 40 per hour in factory 1 and 25 per hour in factory 2. Factories 1 and 2, respectively, have 500 hours and 700 hours of production time available before Christmas that could be used to produce these toys.

It is not known whether these two toys would be continued after Christmas. Therefore, the problem is to determine how many units (if any) of each new toy should be produced before Christmas to maximize the total profit.

(a) Formulate an MIP model for this problem.

C **(b)** Use the computer to solve this model.

(svar b): målfunksjonsverdi = 230 000)

Oppgave 2: Matematisk modellering og modellering og løsning i Excel
The Reliance Manufacturing Company produces an aircraft part. The company can produce the part entirely at a flexible work center with multiple computerized machines. The company has four work centers, all of which are different because they were purchased at different times. Each work center has a single operator; however, the company's operators have different skill levels, resulting in different levels of daily output and product quality. The following tables show the average daily output and average number of defects per day for each of the company's five operators who are capable of producing the aircraft part.

Operator	Average Daily Output per Machine			
	A	B	C	D
1	18	20	21	17
2	19	15	22	18
3	20	20	17	19
4	24	21	16	23
5	22	19	21	21

Operator	Average Number of Defects Daily per Machine			
	A	B	C	D
1	0.3	0.9	0.6	0.4
2	0.8	0.5	1.1	0.7
3	1.1	1.3	0.6	0.8
4	1.2	0.8	0.6	0.9
5	1.0	0.9	1.0	1.0

The company wants to determine which operator to assign to each machine to maximize daily output and keep the percentage of defects to less than 4 %.

a) Formuler en generell binær heltallsmodell for dette problemet. Navnsett indekser, konstanter og variable.
b) Løs modellen ved bruk av Excel.
(svar: optimal målfunksjonsverdi = 83)