Maths 3b exam
Unit 1. Arithmetic and linear programming.

In this exam, calculator is allowed in all sections.

Name:
Date:

Answer the questions in the back or in additional paper. Write the number of the question and, if the answer spans more than one side, write the number of the question again in the other side.

1. Given the sequence
3 6 12 24 …

a) Calculate the common ratio r (1 0 0)
b) Calculate the 9^{th} element (0 1 0)
c) Calculate the sum of the first 16 elements. (0 2 0)

2. One small larva eats away a plant leaf. The first day it eats 1 square millimetre, the second day eats 2, the third day eats 4, the fourth day eats 8 and so on.
It takes the larva 16 days to eat the whole leaf. How long would it take 2 larvas to eat the same leaf?
(0 1 2)

3. Åsa saves 70000 kronor every year for 8 years in an account that gives 2% interest per year.
How much money will there be in the account when she makes the last deposit? (1 2 0)

4. Noah wants to get a loan to buy a car. The loan is 250000 kronor and he wants to have it paid in 15 years. The interest is 5%.
a) How much does he have to pay per year? (2 2 0)
b) When the loan is paid, how much money will he have paid and how much of it is interest? (0 1 1)

5. A factory makes two types of car wheels, standard and light.
In a day the overall number of wheels is never lower than 110 nor higher than 300.
In order to uphold the rights of the people who have standard cars, all companies must manufacture at least 40 standard wheels per day. Also this factory doesn't have enough supplies to make more than 200 standard wheels.

a) Translate the constraints into inequalities (2 0 0)
b) Draw the inequalities in a graph and find the area of interest. (2 2 0)

The company makes a profit of 1200 kr per light wheel and 800 kr per standard wheel.
c) Write a function that models the profit of the company based on the number of wheels made (0 2 0)
d) Find the number of wheels of each type that must be made to have maximum profit. (0 2 0)
e) Find the number of wheels of each type that must be made to have minimum profit. (0 2 0)

Bonus question:
A loan mode very popular among spanish bankers is to let the client only pay the interest for a few years and then start paying the loan. During those years the debt doesn't grow because the interest is paid by the client.
a) How much money would Noah pay in total if he is offered a 5-year period of paying only interest for his loan? (1 1 1)
b) How much of it would be interest? (1 0 0)
c) How much more money (in percentage) would he pay in interest compared with what he would pay without the 5-year period? (1 1 0)