

Question 1. (5 marks) The VECTOR Company compiles two project (Firecat (X) and Thunderfish (Y)) using two machines (A and B). Each compilation of Firecat requires 50 minutes processing time on machine A and 30 minutes processing time on machine B. Each compilation of Thunderfish that is compiled requires 24 minutes processing time on machine A and 33 minutes processing time on machine B. Available processing time for the week on machine A is forecast to be 40 hours and on machine B is forecast to be 35 hours. Company policy is to maximise the combined sum of the compilations of Firecat and Thunderfishes by the end of the week.

- a. (1 mark) Determine the objective function.

- b. (3 marks) Find the constraints that define the feasible region.

Questions 2. (4 marks) Consider the objective function $Z = 4x + 3y$ subject to the following constraints:

$$\begin{cases} x + y \geq 1 \\ x + 2y \leq 4 \\ 2x + y \leq 4 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

If the vertices (corners) of the feasible region are $(1, 0)$, $(2, 0)$, $(0, 2)$, $(0, 1)$, $(4/3, 4/3)$. Find the maximum and minimum values of Z and at what (x, y) point they are reached. And justify!

Questions 3. Sketch the feasible region given by the inequalities below. And also find the feasible region vertices (coners). Show your work!

$$\begin{cases} x+y \geq 3 \\ 3x+4y \leq 24 \\ 4x+3y \leq 24 \\ x \geq 0 \\ y \geq 0 \end{cases}$$