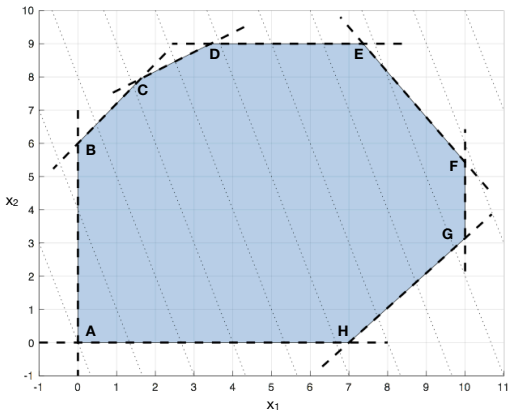
ASE-4046 Exercise 2 (Linear Programming)

Problem 1

Use the graphical method to solve this LP problem.

$$
\begin{aligned}
\text{maximize } & 3x_1 + x_2 \\
\text{such that } & -6x_1 + 5x_2 \leq 30 \\
& -7x_1 + 12x_2 \leq 84 \\
& 19x_1 + 14x_2 \leq 266 \\
& 4x_1 - 7x_2 \leq 28 \\
& 0 \leq x_1 \leq 10 \\
& 0 \leq x_2 \leq 9
\end{aligned}
$$



Problem 2

Suppose the following foods are available:

food	energy kcal/serv	protein g/serv	calcium mg/serv	price €/serv	max no. of servings
oatmeal	110	4	2	0.1	4
chicken	205	32	12	0.8	3
egg	160	13	54	0.4	2
milk	160	8	285	0.3	8
muffin	420	4	22	0.7	2
pea soup	260	14	80	0.6	2

Find the cheapest diet that provides at least 2000 kcal of energy, 55 g of protein, and 800 mg of calcium, and that respects the limit on the number of servings. Which constraints are active?

Problem 3

How fast does `linprog` solve the `qap8` benchmark problem on your computer? How about the `dfl001` benchmark?

Answers 1. optimum = 35.4. 2. 4 oatmeal, 4.5 milk, and 2 muffin servings.