OUC/UoA-Haide-Optimization & Operations Research - 2025 Spring Test

Back

Question 1 Not yet answered Marked out of 1.00 **Time left 0:24:25**

A chocolate manufacturer makes three different types of chocolate eggs:

- milk chocolate (x_1): weight 8g, 45 calories
- dark chocolate (x_2): weight 20g, 30 calories
- white chocolate (x_3): weight 10g, 40 calories

The manufacturer would like to produce a box of chocolate eggs with the smallest amount of calories possible, provided the total weight does not exceed 200g and the total number of eggs is at least 15.

What is the objective of this problem?

Select one:

a. $\max \quad z = 45x_1 + 30x_2 + 40x_3$

b. $\min \quad z = 45x_1 + 30x_2 + 40x_3$

c. $\min \quad z = 8x_1 + 20x_2 + 10x_3$

d. $\min \quad z = x_1 + x_2 + x_3$

e. $\max \quad z = x_1 + x_2 + x_3$

f. $\max \quad z = 8x_1 + 20x_2 + 10x_3$

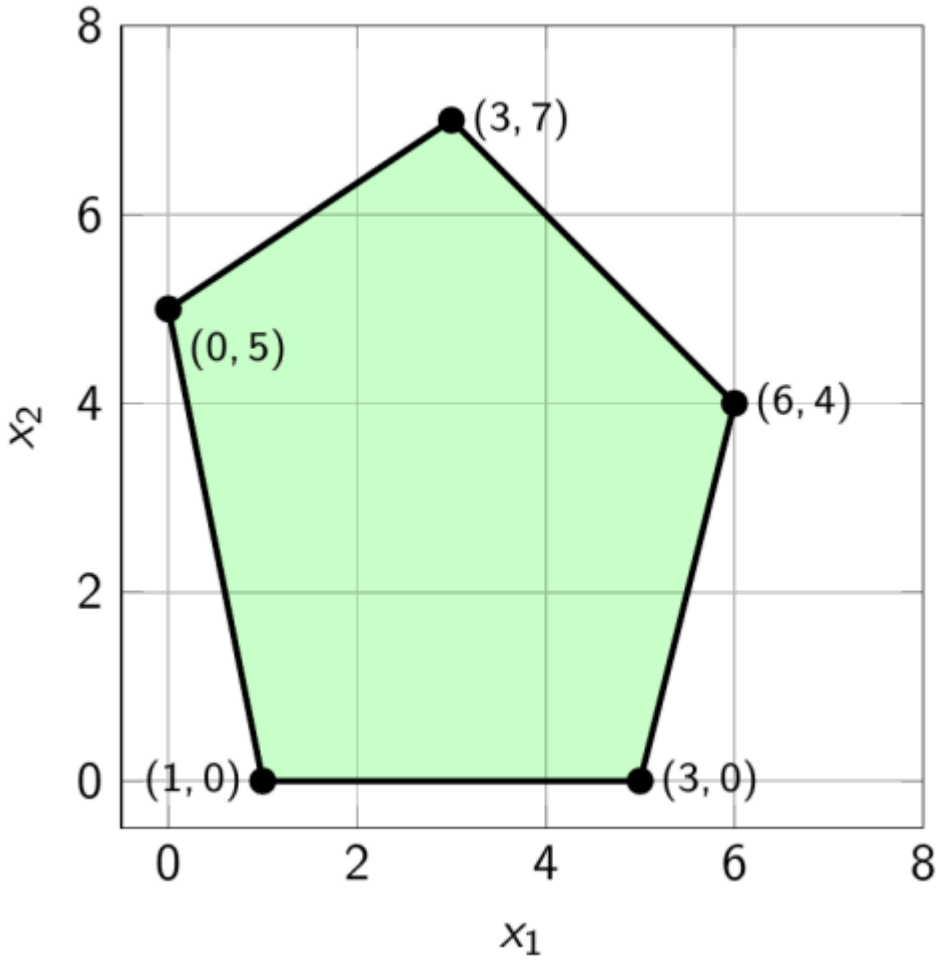
Clear my choice

Question 2 Not yet answered Marked out of 2.00

Consider the following linear programming problem:

$$\max \quad z = 3x_1 + 6x_2$$

subject to the constraints shown in the below feasible region.



What is the optimal solutions to this problem?

Hint: Note the (x_1, x_2) coordinates of the vertices are given in the above plot.

Enter your integer valued answer below.

Answer: 51

Question 3 Not yet answered Marked out of 2.00

Consider the following Simplex tableau in feasible canonical form:

x_1	x_2	x_3	x_4	x_5	x_6	z	b
10	7	2	1	0	0	0	40
-5	12	6	0	1	0	0	5
8	13	9	0	0	1	0	16
-4	10	11	0	0	0	1	0

Applying the mandatory rules for Simplex Phase II from the course notes, what is the location of the appropriate pivot?

Select one:

- a. row 2, column 1
- b. row 1, column 2
- c. row 3, column 1
- d. row 3, column 2
- e. row 2, column 2
- f. row 3, column 3
- g. row 2, column 3
- h. row 1, column 1
- i. row 1, column 3

Clear my choice

Question 4 Not yet answered Marked out of 2.00

Consider the following linear program in standard equality form:

$$\max z = -6x_1 - 8x_2 + 2x_3 + 5x_4$$

subject to

$$\begin{aligned} 2x_1 + x_2 + 2x_3 + 3x_4 &= -5 \\ -8x_2 + 3x_3 + x_5 &= 4 \\ 9x_1 + 2x_5 &= 7, \end{aligned}$$

with x_1, x_2, x_3 and $x_4 \geq 0$.

What is the objective of the dual of this linear program?

Select one:

- a. $\min w = 6y_1 - 2y_2 + 8y_3 - 9y_4$
- b. $\min w = 5y_1 - 4y_2 - 7y_3$
- c. $\min w = -6y_1 + 2y_2 - 8y_3 + 9y_4$
- d. $\min w = -5y_1 + 4y_2 + 7y_3$

Clear my choice

Question 5 Not yet answered Marked out of 2.00

Consider the following drinks, along with their volume per serve (mL) and amount of caffiene per serve (mg).

drink	volume per serve (mL)	caffiene per serve (mg)
espresso coffee	70	159
flat white coffee	200	159
Diet Coca-Cola (can)	375	48
Coca-Cola (bottle)	600	60
green tea	300	34
black tea	300	64
water	150	0

In order to be an effective mathematician, you should drink no more than 1000 mL per day and consume as much caffine as possible. Assume that you can only drink one serve of each drink per day.

Apply a greedy heuristic to find the combination of drinks that maximise the amount of caffiene.

What is the resulting amount of caffiene (in mg)?

Enter your integer valued answer below.

Answer: 430

Question 6

Not yet answered Marked out of 1.00

You would like to solve an integer linear program (ILP) using branch and bound.

You are given that value of the variables (x_1, x_2, x_3) of the solution to the relaxed version of the ILP are

$$(x_1, x_2, x_3) = (5.51, 9.01, 1)$$

Applying the branch and bound procedure from the course notes, which variable should you branch on?

Select the answer from the list below.

Select one:

- a. x_3
- b. x_2
- c. x_1

Clear my choice