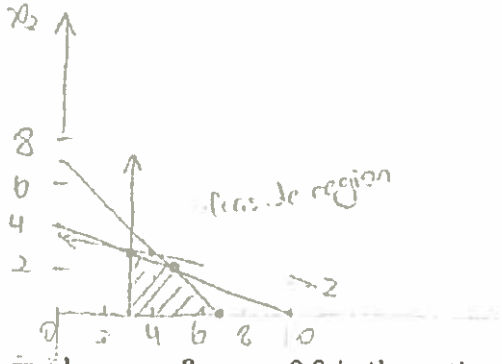
Sample Solution

Math 323 Homework 2

1. max $Z = 30\,x_1 + 100\,x_2$ subject to $x_1 + x_2 \le 7$, $4\,x_1 + 10\,x_2 \le 40$, $x_1 > 3$, and $x_2 \ge 0$.



Based on the graph, x_1 3, $x_2 = 2.8$ is the optimal solution, which gives a revenue of 370 dollars.

Simplex:

Standard Form: max Z $30\,x_1 + 100\,x_2$ subject to $x_1 + x_2 + s_1 = 7$, $4\,x_1 + 10\,x_2 +$ = x_1 e_1 3, and x_2 0.

Tableau:

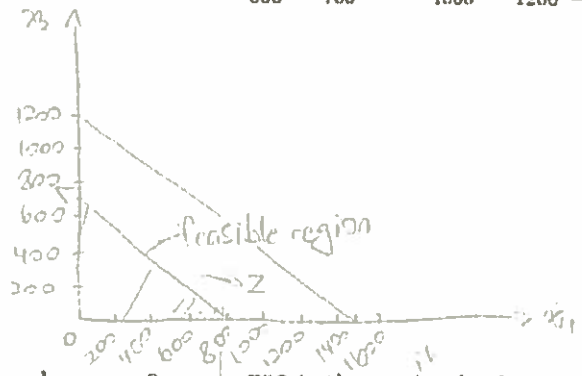
C_B	B	(+30) x_1	(+100) x_2	(+0) s_1	(+0) s_2	(+0) e_1	constraints
30	x_1	1	0	0	0	-1	3
100	x_2	0	1	0	1	4	2.8
0		0	0	1	-1	3	7
	C	0	0	0	-100	-370	Z=370

2. From the graph above,
   a: No.
   b: No.
   c: No.
   d: Yes

3. Max Z $3\,x_1 + 4\,x_2$, subject to $\frac{x_1}{10} + \frac{x_2}{25} < 7$, $\frac{3}{5}\,x_1 + \frac{2}{5}\,x_2 < 40$, x_1 30, and $x_2 > 0$.

4. Let x_1 be the number of Type 1 truck manufactured, and x_2 be the number of Type 2 truck manufactured.

Max Z $300\,x_1 + 500\,x_2$, subject to $\frac{x_1}{800} + \frac{x_2}{700}$ 1, $\frac{x_1}{1500}$ $\frac{x_2}{1200} \le 1$, and x_1, $x_2 \ge 0$.



Based on the graph, $x_1 = 0$, $x_2 = 700$ is the optimal solution, which gives a revenue of 350,000 dollars.

Simplex:
Standard Form: Max $Z = 300\ x_1 + 500\ x_2$, subject to $\frac{x_1}{800} + \frac{x_2}{700} + s_1 = 1$, $\frac{x_1}{1500} + \frac{x_2}{1200} + s_2 = 1$, and $x_1,\ x_2 \geq 0$.

Tableau:

C_B	B	(+300) x_1	(+500) x_2	(+0) s_1	(+0) s_2	constraints
500	x_2	$\frac{7}{8}$	1	700	0	700
	C	-137.5	0	-350,000	0	Z=350,000

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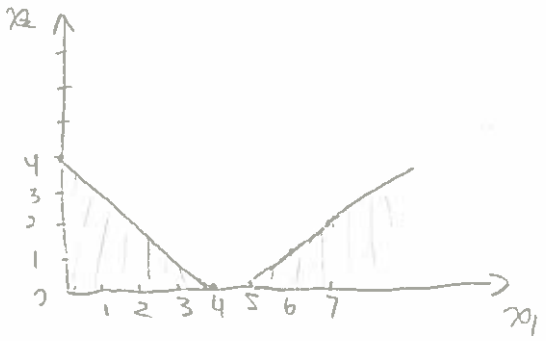
3.3

1. No feasible solution.



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2. The coefficients in front of x_1 and x_2 in the objective function is the same as the coefficients in one of the constraints, so multiple optimal solutions

ratio

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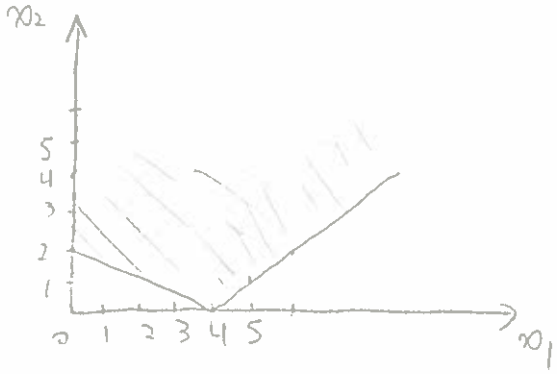
3. Unbounded solutions.



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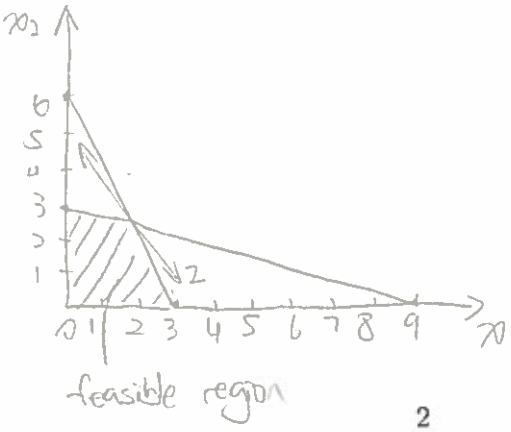
4. Single optimal solution.



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