

7. For the following systems of equations, rewrite the systems as an equation $Ax = b$, do Gaussian Elimination and find the solution:

(a) $2u + 4v = 3$, $3u + 7v = 2$;

(b) $3u + 5v + 3w = 25$, $7u + 9v + 19w = 65$, $-4u + 5v + 11w = 5$;

(c) $u + 2v + 3w = 39$, $u + 3v + 2w = 34$, $3u + 2v + w = 26$;

(d) $u + 3v + 5w = 1$, $3u + 12v + 18w = 1$, $5u + 18v + 30w = 1$.

8. Work on problems 1–4 (graph the feasible regions), 8, and 9 of Section 3.3 of the textbook.

9. Manhattan Beach Brewing Co. is brewing a bock beer and an export beer. The bock beer sells for \$5 per case and the export beer for \$2 per case. To produce a case of bock beer, 2 pounds of hops and 5 pounds of barley are needed, for export beer 1 pound hops and 2 pounds barley are needed (per case). Currently, 60 pounds barley and 25 pounds hops are available.

(a) Rewrite the problem as an LP.

(b) Solve the LP graphically.

10. Given are the following data:

Ingredients (g/500ml)	Lager	Pilsener	Export	Bock
carbohydrates	20	17	20	30
proteine	1.5	1.5	1.55	1.6
calories	185	190	250	310
alcohol	18	20	21.5	24.5
minerals	1.25	1.25	1.5	1.75
costs (\$/500ml)	1.10	1.30	1.20	1.50

Write an LP that calculates the cheapest daily menu that contains at least 250g carbohydrates, 30g proteine, 1000 calories, 150g alcohol, and 25g minerals.

11. Prove that if x and y are optimal solutions of an LP, then every point on the line segment \overline{xy} is also an optimal solution of that LP.

12. Work through Section 3.7 and solve the exercises there.