Math 336
Spring 2024
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Quiz 3

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Problem 1: Use the graphical method to find all optimal solutions for the following model:

$$\begin{array}{lrl} \text{Maximize} & & Z = 500x_1 + 300x_2 \\ \text{subject to} & 15x_1 + 5x_2 & \leq 300, \\ & 10x_1 + 6x_2 & \leq 240, \\ & 8x_1 + 12x_2 & \leq 450, \\ \text{and} & x_1, \quad x_2 & \geq 0. \end{array}$$

Score: /3

Problem 2: Consider the following problem, where the value of c_1 has not yet been ascertained.

$$\begin{array}{lrl} \text{Maximize} & & Z = c_1x_1 + x_2 \\ \text{subject to} & x_1 + x_2 & \leq 6, \\ & x_1 + 2x_2 & \leq 10, \\ \text{and} & x_1, \quad x_2 & \geq 0. \end{array}$$

Use graphical analysis to determine the optimal solution(s) for (x_1, x_2) for the various possible values of $c_1 \in \mathbb{R}$.

Score: /3

/6

Problem 3: Capilano University Heavy Metal Company plans to blend a new alloy of 40 % tin, 35 % zinc, and 25 % lead from several available alloys having the following compositions. The company wants to determine the proportions of these alloys that should be blended to produce the new alloy at a minimum cost. Formulate a linear programming model for this problem.

	Alloy				
	1	2	3	4	5
Percentage of tin	60	25	45	20	50
Percentage of zinc	10	15	45	50	40
Percentage of lead	30	60	10	30	10
Cost ($/kg)	47	44	55	51	57

Score: /4