PART A

(1/1 point)

Problem 3 reviews the transformations from nonlinear constraints or objectives into linear constraints and objectives.

$$\left.\begin{array}{rrcl} \textbf{min} & \max\{2.3x_1 + x_2, 4.3x_1 - 0.5x_2\} & & \\ \textbf{s.t.:} & & & \\ \textbf{Constr1:} & x_1/(x_1+x_2) & \leq & 0.5 \\ \textbf{Constr2:} & 10x_1 + 28x_2 & = & 3.4 \\ \textbf{Constr3:} & x_1 + x_2 & \geq & 1 \\ & x_1 & \textbf{free} & \\ & x_2 & \textbf{free} & \end{array}\right\}$$

We say that a variable is "free" if there are no constraints on the sign of the variable. It is not constrained to be at least 0. It is not constrained to be at most 0.

When reformulated as a linear program, the objective is w. Which of the following correctly models the the objective function using linear constraints?

- [x] $$\left.\begin{array}{lll} \min w & & \\ \text{s.t.:} & & \\ w & \geq & 2.3x_1 + x_2 \\ w & \geq & 4.3x_1 - 0.5x_2 \end{array}\right\}$$

- [ ] $$\left.\begin{array}{lll} \min w & & \\ \text{s.t.:} & & \\ w & \leq & 2.3x_1 + x_2 \\ w & \leq & 4.3x_1 - 0.5x_2 \end{array}\right\}$$

- [ ] $$\left.\begin{array}{lll} \max w & & \\ \text{s.t.:} & & \\ w & \geq & 2.3x_1 + x_2 \\ w & \geq & 4.3x_1 - 0.5x_2 \end{array}\right\}$$

- [ ] $$\left.\begin{array}{lll} \max w & & \\ \text{s.t.:} & & \\ w & \leq & 2.3x_1 + x_2 \\ w & \leq & 4.3x_1 - 0.5x_2 \end{array}\right\}$$

✔

You have used 1 of 3 submissions

PART A2

(1/1 point)

The constraint "$\frac{x_1}{x_1+x_2} \leq 0.5$" models "The value of x_1 is at least half of the sum of x_1 and x_2." Which of the following is a correct method of modeling this constraint using linear inequalities?

- [ ] $0.5x_2 - 0.5x_1 \geq 0$
- [x] $0.5x_1 - 0.5x_2 \leq 0$
- [ ] Neither of the above

✔

You have used 1 of 1 submissions

PART B

(1/1 point)

In part B, we are modeling absolute values in the objective and in the constraints.

$$\left.\begin{array}{rlll} \textbf{min} & |0.8x_1 + 0.9x_2| & & \\ \textbf{s.t.:} & & & \\ \textbf{Constr1:} & |0.9x_1 + 1.2x_2| & \leq & 10 \\ & x_1 & \geq & 0 \\ & x_2 & & \textbf{free} \end{array}\right\}$$

We first consider the constraint $|0.9x_1 + 1.2x_2| \leq 10$. This can be modeled correctly as which of the following? Check all that apply.

- [ ] $0.9x_1 + 1.2x_2 \leq 10$
  $0.9x_1 + 1.2x_2 \geq 10$
- [x] $0.9x_1 + 1.2x_2 \leq 10$
  $0.9x_1 + 1.2x_2 \geq -10$
- [ ] $0.9x_1 + 1.2x_2 \leq 10$
  $0.9x_1 + 1.2x_2 \leq -10$
- [ ] $0.9x_1 + 1.2x_2 \leq 10$
  $0.9x_1 + 1.2x_2 \leq 10$

✔

You have used 1 of 3 submissions

PART B2

(1/1 point)
We model the objective value as w. Which of the following correctly models the objective function. Check all that apply.

$$\left.\begin{array}{lll} & \min w & \\ \text{s.t.:} & & \\ w & \leq & 0.8x_1 + 0.9x_2 \\ w & \geq & -0.8x_1 - 0.9x_2 \end{array}\right\}$$

$$\left.\begin{array}{lll} & \min w & \\ \text{s.t.:} & & \\ w & \geq & 0.8x_1 + 0.9x_2 \\ w & \geq & -0.8x_1 - 0.9x_2 \end{array}\right\}$$

$$\left.\begin{array}{lll} & \max w & \\ \text{s.t.:} & & \\ w & \leq & 0.8x_1 + 0.9x_2 \\ w & \geq & -0.8x_1 - 0.9x_2 \end{array}\right\}$$

$$\left.\begin{array}{lll} & \max w & \\ \text{s.t.:} & & \\ w & \leq & 0.8x_1 + 0.9x_2 \\ w & \leq & -0.8x_1 - 0.9x_2 \end{array}\right\}$$

You have used 2 of 3 submissions

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