PART A

(1/1 point)

$$\left.\begin{array}{rl} \max & 32x_1 + 12x_2 + 22x_3 + 24x_4 + 18x_5 + 13x_6 \\ \text{s.t.:} & \\ & 5x_1 + 9x_2 + 7x_3 + 8x_4 + 6x_5 + 4x_6 \leq 200 \\ & x_1, x_2, x_3 \in \{0,1\} \\ & 0 \leq x_4, x_5, x_6 \leq 100 \end{array}\right\}$$

Which of the statements or constraints below is (by itself) equivalent to the statement "If $x_1 = 1$, then $x_2 = 0$"? HINT: three of the choices are correct.

- [ ] If $x_2 = 0$ then $x_1 = 1$
- [x] If $x_2 = 1$ then $x_1 = 0$
- [ ] $x_1 = 1$ or $x_2 = 1$
- [x] $x_1 = 0$ or $x_2 = 0$

- [x] $x_1 + x_2 \leq 1$
- [ ] $x_1 - x_2 \leq 0$
- [ ] $x_1 + x_2 \geq 1$
- [ ] $x_1 \neq x_2$

✔

You have used 1 of 3 submissions

PART B

(1/1 point)

Which of the statements or constraints below is (by itself) equivalent to the statement "$x_2 = 1$ or $x_3 = 0$ but not both"? HINT: two of the answers are correct.

- [ ] $x_2 = (1 - x_3)$
- [x] $x_2 = x_3$
- [ ] $x_2 \neq x_3$

- [ ] $x_2 - x_3 \leq 0$
- [ ] $-x_2 - x_3 \leq 0$
- [ ] If $x_2 = 1$ then $x_3 = 1$
- [x] $x_2 = 0$ or $x_3 = 1$ but not both

✔

You have used 1 of 3 submissions

PART C

(1/1 point)

Add a binary variable w_1, and add two constraints that ensure that if $w_1 = 1$ then $x_5 + x_6 \geq 70$, and if $w_1 = 0$ then $x_5 + x_6 \leq 69$. Select the two correct constraints from below.

- [ ] $x_5 + x_6 \geq 70 + M(1 - w_1), w_1 \in \{0, 1\}$
- [x] $x_5 + x_6 \geq 70 - M(1 - w_1), w_1 \in \{0, 1\}$
- [ ] $x_5 + x_6 \leq 69 + M(1 - w_1), w_1 \in \{0, 1\}$
- [x] $x_5 + x_6 \leq 69 + Mw_1, w_1 \in \{0, 1\}$

- [ ] $x_5 + x_6 \leq 69 - Mw_1, w_1 \in \{0,1\}$

✔

You have used 1 of 3 submissions

PART D

(1/1 point)

Add 3 binary variables w_2, w_3, and w_4, and 4 constraints so as to ensure that at least one of the constraints $x_4 \leq 92, x_5 \geq 40,$ and $x_6 \leq 74$ are satisfied. Select the 4 correct constraints below.

- [x] $x_4 \leq 92 + M(1-w_2)$
- [ ] $x_4 \leq 92 - M(1-w_2)$
- [ ] $x_5 \geq 40 + M(1-w_3)$
- [x] $x_5 \geq 40 - M(1-w_3)$
- [x] $x_6 \leq 74 + M(1-w_4)$
- [ ] $x_6 \leq 74 - M(1-w_4)$

- [x] $w_2 + w_3 + w_4 \geq 1, w_2, w_3, w_4 \in \{0, 1\}$
- [ ] $w_2 + w_3 + w_4 \leq 1, w_2, w_3, w_4 \in \{0, 1\}$

✔

You have used 1 of 3 submissions

PART E

(1/1 point)

Add a single integer variable w_5 and a constraint that ensures that x_6 is divisible by 2 but not divisible by 4. Equivalently, the remainder when dividing by 4 must be 2. Which of the following constraints satisfies these conditions? Select only one of them.

- $x_6 + 2w_5 = 4, w_5 \geq 0, w_5 \in \mathbf{Z}$
- $x_6 - 2w_5 = 4, w_5 \geq 0, w_5 \in \mathbf{Z}$
- $x_6 - 4w_5 = 2, w_5 \geq 0, w_5 \in \mathbf{Z}$ ✔
- $x_6 + 4w_5 = 2, w_5 \geq 0, w_5 \in \mathbf{Z}$
- None of the choices

You have used 1 of 2 submissions

PART F

(1/1 point)

Add three binary variables $w_6, w_7,$ and w_8 and two constraints that ensures that $x_6 = 13$ or 39 or 88. Select the two correct constraints from below.

- [ ] $x_6 = 13w_6 - 39w_7 - 88w_8$
- [x] $x_6 = 13w_6 + 39w_7 + 88w_8$
- [ ] $w_6 + w_7 + w_8 \geq 1, w_6, w_7, w_8 \in \{0, 1\}$
- [ ] $w_6 + w_7 + w_8 \leq 1, w_6, w_7, w_8 \in \{0, 1\}$
- [x] $w_6 + w_7 + w_8 = 1, w_6, w_7, w_8 \in \{0, 1\}$

✔

You have used 1 of 3 submissions