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$ \begin{aligned} &(\text{Min}) Z = 3X + 5Y \\ &3X + 2Y \geq 6 \\ &2X + Y = 32 \\ &X \leq 5 \\ &Y \geq 1 \\ &X \geq 0 \\ &Y \geq 0 \end{aligned} $	$ \begin{aligned} &(\text{Max}) Z = 4X + 6Y \\ &4X + Y \leq 60 \\ &X + 2Y \leq 50 \\ &Y = 20 \\ &X \geq 6 \\ &X \geq 0 \\ &Y \geq 0 \end{aligned} $	$ \begin{aligned} &(\text{Min}) Z = 4x_1 + 5x_2 \\ &3x_1 + x_2 \leq 27 \\ &5x_1 + 5x_2 = 60 \\ &6x_1 + 4x_2 \geq 60 \\ &x_1 \geq 0 \\ &x_2 \geq 0 \end{aligned} $
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.(Standard)	(Canonique)	-1
	.(Problème Dual)	-2
	.(Simplexe)	-3
	(Problème Primal)	-4

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$ \begin{aligned} &: \quad -2 \\ &(\text{Max}) Z_2 = 2X_1 + X_2 \\ &X_1 + 3X_2 \leq 6 \\ &X_1 + 5X_2 \leq 10 \\ &2X_1 + 2X_2 \leq 8 \\ &X_1 \geq 0 \quad X_2 \geq 0 \end{aligned} $	$ \begin{aligned} &: \quad -1 \\ &(\text{Min}) Z_1 = 5X_1 + 2X_2 + X_3 \\ &2X_1 + 3X_2 + X_3 \geq 20 \\ &6X_1 + 8X_2 + 5X_3 \geq 30 \\ &7X_1 + X_2 + 3X_3 \geq 40 \\ &X_1 + 2X_2 + 4X_3 \geq 50 \\ &X_1 \geq 0 \quad X_2 \geq 0 \quad X_3 \geq 0 \end{aligned} $
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$$\begin{aligned}
 & : \quad -4 \\
 (\text{Max}) \quad Z_1 &= 200X_1 + 30X_2 + 75X_3 \\
 X_1 + 2X_2 + 3X_3 &= 200 \\
 2X_1 + 3X_2 + X_3 &\geq 180 \\
 4X_1 + 2X_2 + 3X_3 &= 130 \\
 3X_1 + 5X_2 + 2X_3 &\leq 50 \\
 X_1 \geq 0 \quad X_2 \geq 0 \quad X_3 \geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \quad -3 \\
 (\text{Min}) \quad Z_1 &= w_1 + 3w_2 + 2w_3 \\
 4w_1 + 8w_2 + 6w_3 &= 25 \\
 5w_1 + 7w_2 + w_3 &\geq 10 \\
 7w_1 + 5w_2 + 3w_3 &= 30 \\
 w_1 + 3w_2 + 5w_3 &\leq 80 \\
 w_1 \geq 0 \quad w_2 \geq 0 \quad w_3 \geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \\
 (\text{Min}) \quad Z_2 &= 4X_1 + 3X_2 \\
 2X_1 + X_2 &\geq 0 \\
 X_1 + 2X_2 &\geq 2 \\
 X_1, X_2 &\geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \\
 (\text{Min}) \quad Z_1 &= 3X_1 + 5X_2 \\
 3X_1 + 2X_2 &\geq 6 \\
 X_1 &\leq 5 \\
 X_2 &\geq 1 \\
 X_1, X_2 &\geq 0
 \end{aligned}$$

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-1

-2

$$\begin{aligned}
 & : \quad -2 \\
 (\text{Min}) \quad Z_2 &= 6X_1 + 4X_2 + 24X_3 \\
 2X_1 + 2X_2 + 6X_3 &\geq 18 \\
 3X_1 + X_2 + 3X_3 &\geq 10 \\
 X_1 \geq 0 \quad X_2 \geq 0 \quad X_3 \geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \quad -1 \\
 (\text{Min}) \quad Z_1 &= 24X_1 + 18X_2 + 36X_3 \\
 4X_1 + 2X_2 + 3X_3 &\geq 5 \\
 6X_1 + X_2 + 9X_3 &\geq 8 \\
 X_1 \geq 0 \quad X_2 \geq 0 \quad X_3 \geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \quad -4 \\
 (\text{Min}) \quad Z_2 &= 36X_1 + 18X_2 + 24X_3 \\
 2X_1 + 2X_2 + 4X_3 &\geq 5 \\
 9X_1 + X_2 + 6X_3 &\geq 6 \\
 X_1 \geq 0 \quad X_2 \geq 0 \quad X_3 \geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \quad -3 \\
 (\text{Min}) \quad Z_1 &= 6X_1 + 4X_2 + 24X_3 \\
 2X_1 + 2X_2 + 6X_3 &\geq 18 \\
 3X_1 + X_2 + 3X_3 &\leq 18 \\
 X_1 \geq 0 \quad X_2 \geq 0, \quad X_3 \geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \quad -6 \\
 ((\text{Max}) \quad Z_3 &= 3X_1 + 4X_2 + 3X_3 \\
 3X_1 + 2X_2 + X_3 &\leq 960 \\
 5X_1 + 8X_2 + 4X_3 &\leq 5000 \\
 3X_1 + 6X_2 + 3X_3 &\leq 2400 \\
 X_1 \geq 0, \quad X_2 \geq 0, \quad X_3 \geq 0
 \end{aligned}$$

$$\begin{aligned}
 & : \quad -5 \\
 (\text{Max}) \quad Z_3 &= 25X_1 + 8X_2 + 35X_3 \\
 12X_1 + 6X_2 + 10X_3 &\leq 3200 \\
 5X_1 + 8X_2 + 12X_3 &\leq 3450 \\
 X_1 &\leq 50 \\
 X_3 &\leq 200 \\
 X_1 \geq 0, \quad X_2 \geq 0, \quad X_3 \geq 0
 \end{aligned}$$

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$$\begin{aligned}
 (\text{Min}) Z &= 5X_1 + 2X_2 \\
 2X_1 + 5X_2 &\geq 10 \\
 X_1 + X_2 &\geq 4 \\
 X_1, X_2 &\geq 0
 \end{aligned}$$

$$\begin{aligned}
 (\text{Min}) Z &= 6X_1 + 3X_2 + 5X_3 \\
 6X_1 + 3X_2 + X_3 &\geq 2 \\
 3X_1 + 4X_2 + X_3 &\leq 5 \\
 X_1 &\geq 0 \\
 X_2 &\geq 0 \\
 X_3 &\geq 0
 \end{aligned}$$

$$\begin{aligned}
 (\text{Max}) Z &= 20X_1 + 30X_2 + 40X_3 \\
 X_1 + X_2 + X_3 &\leq 1 \\
 X_1 + X_2 + 2X_3 &= 2 \\
 3X_1 + 2X_2 + X_3 &\geq 4 \\
 X_1 \geq 0, X_2 \geq 0, X_3 \geq 0
 \end{aligned}$$

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$$\begin{aligned}
 4X + 2Y &\geq 60 \\
 2X + 4Y &\geq 48 \\
 Y \geq 0, X &\geq 0
 \end{aligned}$$

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$$(\text{Min}) Z_2 = 30X + 20Y$$

$$(\text{Max}) Z_1 = 5X + 10Y$$

$$(\text{Min}) Z_4 = 15X + 30Y$$

$$(\text{Max}) Z_3 = 20X + 8Y$$

(G₁, G₂)

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(Z₁, Z₂, Z₃)

(A₁, A₂, A₃)

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		G ₂	G ₁	
Z ₁	20	4	4	A ₁
Z ₂	22	6	4	A ₂
Z ₃	18	1	6	A ₃

G₁

65 G₂

54

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