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Algorithm and examples

Method 6. Primal to Dual

Solve the Linear programming problem using Primal to dual conversion calculator

Type your linear programming problem

MAX $z = x_1 + 3x_2 + 2x_3$
 subject to
 $x_1 \leq 10$
 $x_2 \leq 10$
 $3x_1 + x_2 + 5x_3 \leq 10$
 $x_1 + 3x_2 \leq 12$

OR

Total Variables : 3 Total Constraints : 5 [Generate](#)

Max $z = 1x_1 + 3x_2 + 2x_3$

Subject to constraints

1 $x_1 + 0x_2 + 0x_3 \leq 10$
 0 $x_1 + 1x_2 + 0x_3 \leq 10$
 3 $x_1 + 1x_2 + 5x_3 \leq 10$
 1 $x_1 + 3x_2 + 0x_3 \leq 12$
 0 $x_1 + 0x_2 + 1x_3 \geq 2$

and $x_1, x_2, x_3 \geq 0$ and unrestricted in sign ☐ x_1 , ☐ x_2 , ☐ x_3

Mode : Decimal

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Solution will be displayed step by step (In 2 parts)

Solution

Find dual from primal conversion

MAX $z = x_1 + 3x_2 + 2x_3$
 subject to
 $x_1 \leq 10$
 $x_2 \leq 10$
 $3x_1 + x_2 + 5x_3 \leq 10$
 $x_1 + 3x_2 \leq 12$
 $x_3 \geq 2$

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NOW!and $x_1, x_2, x_3 \geq 0$;all \geq constraints can be converted to \leq type by multiplying both sides by -1

$$\text{MAX } z_x = x_1 + 3x_2 + 2x_3$$

subject to

$$x_1 \leq 10$$

$$x_2 \leq 10$$

$$3x_1 + x_2 + 5x_3 \leq 10$$

$$x_1 + 3x_2 \leq 12$$

$$-x_3 \leq -2$$

and $x_1, x_2, x_3 \geq 0$;Dual is (Solution steps of Dual by **BigM method**)

$$\text{MIN } z_y = 10y_1 + 10y_2 + 10y_3 + 12y_4 - 2y_5$$

subject to

$$y_1 + 3y_3 + y_4 \geq 1$$

$$y_2 + y_3 + 3y_4 \geq 3$$

$$5y_3 - y_5 \geq 2$$

and $y_1, y_2, y_3, y_4, y_5 \geq 0$;CLICK TO GET A
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