

Q: Solve the instance of the linear programming problem given in Section 6.6:

$$\begin{aligned} &\text{maximize } 0.10x + 0.07y + 0.03z \\ &\text{subject to } x + y + z = 100 \\ &\quad x \leq \frac{1}{3}y \\ &\quad z \geq 0.25(x + y) \\ &\quad x \geq 0, \quad y \geq 0, \quad z \geq 0 \end{aligned}$$

A: Let x , y , and z be the amounts (in millions of dollars) invested in stocks, bonds, and cash, respectively.

$$\begin{aligned} x + y + (0.25(x + y)) &= 100 \\ x + y + 0.25x + 0.25y &= 100 \\ \frac{5}{4}(x + y) &= 100 \\ x + y &= \frac{4(100)}{5} = 80 \end{aligned}$$

$$\begin{aligned} 80 + z &= 100 \\ z &= 100 - 80 = 20 \end{aligned}$$

$$\begin{aligned} \frac{1}{3}y + y &= 80 \\ \frac{4}{3}y &= 80 \\ y &= \frac{3(80)}{4} = 60 \\ x &= 80 - y = 80 - 60 = 20 \end{aligned}$$

\therefore Put 20 million dollars in stocks, 60 million dollars in bonds, and 20 million dollars in cash.