

Conditional Solutions

- ① Write the equations (y depends x)
- ② Find when the plans cost the same (intersection pts)
- ③ Sketch the graphs and highlight the lowest portion (cost) or highest portion (income)
- ④ Write your conclusion

Solving 3x3 Systems of Equations - Elimination

3x3 → 3 equations with 3 unknowns.

- Example
- ① $x - 2y + 3z = 3$
 - ② $2x + 5z = 8 - y \rightarrow 2x + y + 5z = 8$
 - ③ $3x - y - 3z = -22$

Choose 2 equations to eliminate a variable
 ② + ③ y

$$\begin{array}{r} 2x + y + 5z = 8 \\ + 3x - y - 3z = -22 \\ \hline \textcircled{4} \quad 5x + 2z = -14 \end{array}$$

Choose 2 other equations to eliminate the SAME variable.
 ① and ② y

$$\begin{array}{r} x - 2y + 3z = 3 \\ 2(2x + y + 5z = 8) \rightarrow \begin{array}{r} x - 2y + 3z = 3 \\ + 4x + 2y + 10z = 16 \\ \hline \textcircled{5} \quad 5x + 13z = 19 \end{array} \end{array}$$

The new equations ④ and ⑤ are a system of two equations with 2 unknowns.

$$\begin{array}{r} \textcircled{4} \quad 5x + 2z = -14 \\ \textcircled{5} \quad -(5x + 13z = 19) \rightarrow \begin{array}{r} 5x + 2z = -14 \\ -5x - 13z = -19 \\ \hline -11z = -33 \\ z = \frac{-33}{-11} \\ \boxed{z = 3} \end{array} \end{array}$$

Sub $z = 3$ into ④

$$\begin{array}{l} 5x + 2z = -14 \\ 5x + 2(3) = -14 \\ 5x + 6 = -14 \\ 5x = -20 \\ \boxed{x = -4} \end{array}$$

Sub $z = 3, x = -4$ into ①

$$\begin{array}{l} x - 2y + 3z = 3 \\ -4 - 2y + 3(3) = 3 \\ -4 - 2y + 9 = 3 \\ -2y + 5 = 3 \\ -2y = -2 \\ \boxed{y = 1} \end{array}$$

Solution:

$$x = -4, y = 1, z = 3$$