**The All Integer Method**
**Example 2**

Solve for $x$, $y$ and $z$ using the all integers method:

$$3x + 2z = 9$$
$$x - y - 3z = -3$$
$$-x + 2y + 4z = 5$$

| $x$ | $y$ | $z$ | |
|---|---|---|---|
| 3* | 0 | 2 | 9 |
| 1 | -1 | -3 | -3 |
| -1 | 2 | 4 | 5 |

Setup Table

| | | | |
|---|---|---|---|
| 3 | 0 | 2 | 9 |
| 0 | -3* | -11 | -18 |
| 0 | 6 | 14 | 24 |

$(3)(-1) - (0)(1) = -3$

$(3)(2) - (0)(-1) = 6$

$(3)(-3) - (2)(1) = -11$

$(3)(4) - (2)(-1) = 14$

$(3)(-3) - (9)(1) = -18$

$(3)(5) - (9)(-1) = 24$

Solve for $x$, $y$ and $z$ using the all integers method:

$$3x + 2z = 9$$
$$x - y - 3z = -3$$
$$-x + 2y + 4z = 5$$

| $x$ | $y$ | $z$ | |
|---|---|---|---|
| 3 | 0 | 2 | 9 |
| 1 | -1 | -3 | -3 |
| -1 | 2 | 4 | 5 |
| 3* | 0 | 2 | 9 |
| 0 | -3* | -11 | -18 |
| 0 | 6 | 14 | 24 |
| -3 | 0 | -2 | -9 |
| 0 | -3 | -11 | -18 |
| 0 | 0 | 8* | 12 |

Setup Table

First Tableau
First Pivot = 3

$$\frac{(-3)(3) - (0)(0)}{3} = \frac{-9}{3} = -3$$

$$\frac{(-3)(2) - (0)(-11)}{3} = \frac{-6}{3} = -2$$

$$\frac{(-3)(9) - (0)(-18)}{3} = -9$$

$$\frac{(-3)(14) - (-11)(6)}{3} = 8$$

$$\frac{(3)(24) - (-18)(6)}{3} = 12$$

Solve for $x$, $y$ and $z$ using the all integers method:

$$3x + 2z = 9$$
$$x - y - 3z = -3$$
$$-x + 2y + 4z = 5$$

| $x$ | $y$ | $z$ | |
|---|---|---|---|
| 3 | 0 | 2 | 9 |
| 1 | -1 | -3 | -3 |
| -1 | 2 | 4 | 5 |
| 3* | 0 | 2 | 9 |
| 0 | -3 | -11 | -18 |
| 0 | 6 | 14 | 24 |
| -3 | 0 | -2 | -9 |
| 0 | -3* | -11 | -18 |
| 0 | 0 | 8* | 12 |
| 8 | 0 | 0 | 16 |
| 0 | 8 | 0 | -18 |
| 0 | 0 | 8 | 12 |

Setup Table

First Tableau
First Pivot = 3

Second Tableau
Second Pivot = -3

$$\frac{(8)(-9) - (-2)(12)}{-3} = 16$$

$$\frac{(8)(-18) - (-11)(12)}{-3} = -18$$

Solve for $x$, $y$ and $z$ using the all integers method:

$$3x + 2z = 9$$
$$x - y - 3z = -3$$
$$-x + 2y + 4z = 5$$

| $x$ | $y$ | $z$ | | |
|---|---|---|---|---|
| 3 | 0 | 2 | 9 | Setup Table |
| 1 | -1 | -3 | -3 | |
| -1 | 2 | 4 | 5 | |
| 3* | 0 | 2 | 9 | First Tableau |
| 0 | -3 | -11 | -18 | First Pivot = 3 |
| 0 | 6 | 14 | 24 | |
| -3 | 0 | -2 | -9 | Second Tableau |
| 0 | -3* | -11 | -18 | Second Pivot = -3 |
| 0 | 0 | 8 | 12 | |
| 8 | 0 | 0 | 16 | Third Tableau |
| 0 | 8 | 0 | 4 | Third Pivot = 8 |
| 0 | 0 | 8* | 12 | |
| 1 | 0 | 0 | 2 | |
| 0 | 1 | 0 | $4/8 = 1/2$ | |
| 0 | 0 | 1 | $12/8 = 3/2$ | |

$X = 2$

$Y = 1/2$

$Z = 3/2$

Solve for $x$, $y$ and $z$ using the all integers method:

$$3x + 2z = 9$$
$$x - y - 3z = -3$$
$$-x + 2y + 4z = 5$$

| $x$ | $y$ | $z$ | |
|---|---|---|---|
| 3 | 0 | 2 | 9 |
| 1 | -1 | -3 | -3 |
| -1 | 2 | 4 | 5 |
| 3* | 0 | 2 | 9 |
| 0 | -3 | -11 | -18 |
| 0 | 6 | 14 | 24 |
| -3 | 0 | -2 | -9 |
| 0 | -3* | -11 | -18 |
| 0 | 0 | 8 | 12 |
| 8 | 0 | 0 | 16 |
| 0 | 8 | 0 | 4 |
| 0 | 0 | 8* | 12 |

Setup Table

First Tableau
First Pivot = 3

Second Tableau
Second Pivot = -3

Third Tableau
Third Pivot = 8

| $x$ | $y$ | $z$ | |
|---|---|---|---|
| 1 | 0 | 0 | 2 |
| 0 | 1 | 0 | 1/2 |
| 0 | 0 | 1 | 3/2 |

$x = 2$

$y = 1/2$

$z = 3/2$

**The All Integer Method**
**Example 3**

Solve for $x$ and $y$ using the all integers method:

$$2x - y = 4$$
$$x + y = 5$$

Solve for $x$ and $y$ using the all integers method:

$2x - y = 4$

$x + y = 5$

| $x$ | $y$ | |
|---|---|---|
| 2* | -1 | 4 |
| 1 | 1 | 5 |
| 2 | -1 | 4 |
| 0 | 3* | 6 |

Setup Table

$(2)(1) - (-1)(1) = 3$

$(2)(5) - (4)(1) = 6$

Solve for $x$ and $y$ using the all integers method:

$$2x - y = 4$$
$$x + y = 5$$

| $x$ | $y$ | |
|---|---|---|
| 2 | -1 | 4 |
| 1 | 1 | 5 |

Setup Table

| | | |
|---|---|---|
| 2* | -1 | 4 |
| 0 | 3* | 6 |

First Tableau
First Pivot = 2

| | | |
|---|---|---|
| 3 | 0 | 9 |
| 0 | 3 | 6 |

| | | |
|---|---|---|
| 1 | 0 | 3 |
| 0 | 1 | 2 |

$$\frac{(3)(4) - (6)(-1)}{2} = \frac{18}{2} = 9$$

$x = 3$

$y = 2$

Solve for $x$ and $y$ using the all integers method:

$$2x - y = 4$$
$$x + y = 5$$

| $x$ | $y$ | | |
|---|---|---|---|
| 2 | -1 | 4 | Setup Table |
| 1 | 1 | 5 | |
| 2* | -1 | 4 | First Tableau |
| 0 | 3 | 6 | First Pivot = 2 |
| 3 | 0 | 9 | Second Tableau |
| 0 | 3* | 6 | Second Pivot = 3 |

Solve for $x$ and $y$ using the all integers method:

$$2x - y = 4$$
$$x + y = 5$$

| $x$ | $y$ | | |
|---|---|---|---|
| 2 | -1 | 4 | Setup Table |
| 1 | 1 | 5 | |
| 2* | -1 | 4 | First Tableau |
| 0 | 3 | 6 | First Pivot = 2 |
| 3 | 0 | 9 | Second Tableau |
| 0 | 3* | 6 | Second Pivot = 3 |
| 1 | 0 | 3 | |
| 0 | 1 | 2 | |

$x = 3$

$y = 2$