Lineare Gleichungssysteme lösen

Aufgabe 1: Einsetzungsverfahren
Löse mit dem Einsetzungsverfahren

Lösung:

1)
$$-4y + 20x = -52$$
$$y = -3x -3$$

1)
$$-4 \cdot (-3x -3) + 20x = -52 \qquad | \; T$$
$$12x + 12 + 20x = -52 \qquad | \; T$$
$$32x + 12 = -52 \qquad | -12$$
$$32x = -64 \qquad | :32$$
$$x = -2$$
Einsetzen in 2. Gleichung
$$y = -3 \cdot (-2) -3 = 3$$
$$L = \{ \, (-2|3) \, \}$$

2)
$$-2y + 2x = -16$$
$$y = 4x + 17$$

2)
$$-2 \cdot (4x + 17) + 2x = -16 \qquad | \; T$$
$$-8x -34 + 2x = -16 \qquad | \; T$$
$$-6x -34 = -16 \qquad | + 34$$
$$-6x = 18 \qquad | :(-6)$$
$$x = -3$$
Einsetzen in 2. Gleichung
$$y = 4 \cdot (-3) + 17 = 5$$
$$L = \{ \, (-3|5) \, \}$$

3)
$$2y + 2x = -8$$
$$y = -4x -19$$

3)
$$2 \cdot (-4x -19) + 2x = -8 \qquad | \; T$$
$$-8x -38 + 2x = -8 \qquad | \; T$$
$$-6x -38 = -8 \qquad | + 38$$
$$-6x = 30 \qquad | :(-6)$$
$$x = -5$$
Einsetzen in 2. Gleichung
$$y = -4 \cdot (-5) -19 = 1$$
$$L = \{ \, (-5|1) \, \}$$

4)
$$-4y + 16x = -56$$
$$y = -3x -7$$

4)
$$-4 \cdot (-3x -7) + 16x = -56 \qquad | \; T$$
$$12x + 28 + 16x = -56 \qquad | \; T$$
$$28x + 28 = -56 \qquad | -28$$
$$28x = -84 \qquad | :28$$
$$x = -3$$
Einsetzen in 2. Gleichung
$$y = -3 \cdot (-3) -7 = 2$$
$$L = \{ \, (-3|2) \, \}$$

5)
$$-2y -2x = 12$$
$$y = -5x -26$$

5)
$$-2 \cdot (-5x -26) -2x = 12 \qquad | \; T$$
$$10x + 52 -2x = 12 \qquad | \; T$$
$$8x + 52 = 12 \qquad | -52$$
$$8x = -40 \qquad | :8$$
$$x = -5$$
Einsetzen in 2. Gleichung
$$y = -5 \cdot (-5) -26 = -1$$
$$L = \{ \, (-5|-1) \, \}$$

6)
$$4y + 4x = -12$$
$$y = 4x + 22$$

6)
$$4 \cdot (4x + 22) + 4x = -12 \qquad | \; T$$
$$16x + 88 + 4x = -12 \qquad | \; T$$
$$20x + 88 = -12 \qquad | -88$$
$$20x = -100 \qquad | :20$$
$$x = -5$$
Einsetzen in 2. Gleichung
$$y = 4 \cdot (-5) + 22 = 2$$
$$L = \{ \, (-5|2) \, \}$$