1. First we number the equations for convenience:

$$9x + 10y = -102 \qquad (1)$$
$$-2x + 2y = 10 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (2) by -5 , giving

$$9x + 10y = -102 \qquad (3)$$
$$10x - 10y = -50 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$10x + 9x - 10y + 10y = -50 - 102 \qquad (5)$$

Simplifying equation (5) gives

$$19x = -152 \qquad (6)$$
$$x = -8 \qquad (7)$$

Next we substitute the value for x into equation (1) to obtain the value for y, giving

$$9 \times (-8) + 10y = -102$$
$$10y = -30 \qquad \text{so}$$
$$y = -3$$

Hence the simultaneous solution to equations (1) and (2) is $(-8, -3)$.

(As good boys and girls always do, check your answers by substituting into equations (1) and (2):

$$(1) \ \ 9 \times (-8) + 10 \times (-3) = -102 \qquad\qquad (2) \ \ -2 \times (-8) + 2 \times (-3) = 10$$
$$-72 - 30 = -102 \qquad\qquad\qquad 16 - 6 = 10$$
$$-102 = -102 \qquad\qquad\qquad\qquad 10 = 10$$

Both equations turned into true statements, as required. Hence the answer is correct.)

2. First we number the equations for convenience:

$$-21x + 49y = 196 \qquad (1)$$
$$-3x + 7y = 28 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (2) by -7 , giving

$$-21x + 49y = 196 \qquad (3)$$
$$21x - 49y = -196 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$21x - 21x - 49y + 49y = -196 + 196 \qquad (5)$$

Simplifying equation (5) gives

$$0 = 0 \qquad (6)$$

Statement (6) is **always true**, so there is an infinite number of solutions to our simultaneous equations.

3. First we number the equations for convenience:

$$-3x - 10y = 7 \qquad (1)$$
$$-9x + 4y = -13 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (1) by -3 , giving

$$9x + 30y = -21 \qquad (3)$$
$$-9x + 4y = -13 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$9x - 9x + 30y + 4y = -21 - 13 \qquad (5)$$

Simplifying equation (5) gives

$$34y = -34 \qquad (6)$$
$$y = -1 \qquad (7)$$

Next we substitute the value for y into equation (1) to obtain the value for x, giving

$$-3x - 10 \times (-1) = 7$$
$$-3x = -3 \qquad \text{so}$$
$$x = 1$$

Hence the simultaneous solution to equations (1) and (2) is $(1, -1)$.

(As good boys and girls always do, check your answers by substituting into equations (1) and (2):

$$(1) \quad -3 \times 1 - 10 \times (-1) = 7 \qquad\qquad (2) \quad -9 \times 1 + 4 \times (-1) = -13$$
$$-3 + 10 = 7 \qquad\qquad\qquad -9 - 4 = -13$$
$$7 = 7 \qquad\qquad\qquad -13 = -13$$

Both equations turned into true statements, as required. Hence the answer is correct.)

4. First we number the equations for convenience:

$$-3x + 7y = 43 \qquad (1)$$
$$-15x + 35y = 215 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (1) by -5 , giving

$$15x - 35y = -215 \qquad (3)$$
$$-15x + 35y = 215 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$15x - 15x - 35y + 35y = -215 + 215 \qquad (5)$$

Simplifying equation (5) gives

$$0 = 0 \qquad (6)$$

Statement (6) is **always true**, so there is an infinite number of solutions to our simultaneous equations.

5. First we number the equations for convenience:

$$2x - 3y = 23 \qquad (1)$$
$$-9x + 5y = -95 \qquad (2)$$

It's probably easier to solve these using elimination. Multiply equation (1) by 5 and equation (2) by 3 , giving

$$10x - 15y = 115 \qquad (3)$$
$$-27x + 15y = -285 \qquad (4)$$

We add both sides of equations (3) and (4) , giving

$$10x - 27x - 15y + 15y = 115 - 285 \qquad (5)$$

Simplifying equation (5) gives

$$-17x = -170 \qquad (6)$$
$$x = 10 \qquad (7)$$

Next we substitute the value for x into equation (1) to obtain the value for y, giving

$$2 \times 10 - 3y = 23$$
$$-3y = 3 \qquad \text{so}$$
$$y = -1$$

Hence the simultaneous solution to equations (1) and (2) is $(10, -1)$.

(As good boys and girls always do, check your answers by substituting into equations (1) and (2):

(1) $2 \times 10 - 3 \times (-1) = 23$
$\qquad 20 + 3 = 23$
$\qquad 23 = 23$

(2) $-9 \times 10 + 5 \times (-1) = -95$
$\qquad -90 - 5 = -95$
$\qquad -95 = -95$

Both equations turned into true statements, as required. Hence the answer is correct.)