Worksheet: Simultaneous Equations

1) Solve the following simultaneous equations:

a) \( y = x + 4 \)
   \( y = 2x + 3 \)

b) \( y - 2x = 4 \)
   \( 3x = y + 1 \)

c) \( \frac{y}{2} - x = 2 \)
   \( 6x = 2y + 2 \)

d) \( x = 2y + 4 \)
   \( x = 3y - 1 \)

e) \( \alpha + 2\beta = 7 \)
   \( \beta + \alpha = 4 \)

f) \( 3y - 2x - 7 = 0 \)
   \( 2y + 5x - 11 = 0 \)

g) \( \frac{x}{5} + \frac{y}{10} = 4 \)
   \( x - y = -10 \)

h) \( 0.72P - 4.3Q = 5 \)
   \( 5.21P + 4.91Q = 7 \)

i) \( A + B = 0 \)
   \( A - B = 1 \)

2) Sketch the graphs of \( y \) against \( x \) and, where possible, solve:

a) \( y = 5x + 5 \)
   \( y = 6x + 5 \)

b) \( y = 5 \)
   \( y = 6x \)

c) \( x = 5 \)
   \( y = 6x \)

d) \( y + 4x = 5 \)
   \( y + 4.1x = 5.1 \)

e) \( y + 4x = 5 \)
   \( y + 4.01x = 5.1 \)

f) \( y + 4x = 5 \)
   \( y + 4x = 5.1 \)
3) a) For what value of $a$ do the equations

$$y - 3x + 7 = 0$$
$$6x - ay + 3 = 0$$

have no solutions?

b) For what value of $b$ do the equations

$$y - 3x - b = 0$$
$$6x - 2y + 3 = 0$$

have infinite solutions?

4) I think of two numbers. If I add them together I get eight. If I multiply one of them by four and the other by two and then add them, I get twenty-two. What are the numbers?

5) I’ve got pigs and chickens on my farm but I won’t tell you how many I have. But I will tell you how many legs they have. There are twenty-two legs. I will tell you how many heads there are too. There are eight heads, all looking at me. Now you tell me how many pigs I have and how many chickens I have got.

6) At my café, cakes cost four pounds and sandwiches are two pounds. Eight people come to my café and they all have either a cake or a sandwich. At the end of the day I have made twenty-two pounds. How many cakes and how many sandwiches did I sell?

7) One line has gradient $-2$ and goes through the point $(0,3)$. Another line goes through the points $(-2,10)$ and $(3,5)$. What is the coordinate of their point of intersection?