(a) For injectivity, let $a_1 = (x_1, y_1), a_2 = (x_2, y_2) \in \mathbb{R}^2$ & suppose $f(a_1) = f(a_2)$.

Then $(x_1+y_1, x_1-y_1) = (x_2+y_2, x_2-y_2)$, so

$$x_1+y_1 = x_2+y_2 \quad \text{—(1.)}$$
$$\& \quad x_1-y_1 = x_2-y_2 \quad \text{—(2.)}$$

(1.)+(2.) gives $2x_1 = 2x_2$, so $x_1 = x_2$.

Then, from (1.), $x_1+y_1 = x_1+y_2$, so $y_1 = y_2$.

Hence $a_1 = a_2$ and f is injective.

For surjectivity, take any $b = (u,v) \in \mathbb{R}^2$ and put $a = \left(\frac{u+v}{2}, \frac{u-v}{2}\right)$. Then $a \in \mathbb{R}^2$ and

$$f(a) = \left(\frac{u+v}{2} + \frac{u-v}{2}, \frac{u+v}{2} - \frac{u-v}{2}\right)$$
$$= (u,v)$$
$$= b.$$

$\therefore$ f is surjective.

Thus, since f is injective & surjective it is bijective, with inverse $g: \mathbb{R}^2 \to \mathbb{R}^2$, $g(u,v) = \left(\frac{u+v}{2}, \frac{u-v}{2}\right)$.

(b) Since $h(0,1) = h(0,2) = (0,0)$ it follows that h is not injective.

Also, if $(x,y) \in \mathbb{R}^2$ with $h(x,y) = (0,1)$ then $(2x, xy) = (0,1)$, so $x = 0$ & $xy = 1$, a contradiction.

$\therefore$ h is not surjective.