(4)

Let $S = \mathbb{R} \times \mathbb{R}$. Define a relation R on S as follows:
$R = (a,b),(c,d)|a+b=c+d$.

(a) prove R is an equivalence relation

$\forall (a,b) \in S, a+b=a+b$ so R is reflexive.
$\forall (a,b) \in S, a+b=c+d \implies c+d=a+b$ so R is symmetric.
$\forall ((a,b),(c,d),(e,f)) \in S, a+b=c+d, c+d=e+f \implies a+b=e+f$ so R is transitive.

Since R is reflexive, symmetric and transitive, R is an equivalence relation.