HOMEWORK 3

Due Oct 6 (Not 8th)

1. Problems 2.14 (p 48), 2.17 (p50) 2.20,2.21 (p54) in Teschl
2. Suppose Ω is a subset of R^n and $f, g : \Omega \to R^n$ are continuous (and Lipschiz, though that doesn't come into the main point here) and there is a continuous positive function, $h : \Omega \to (0, \infty)$ such that $g(u) = h(u)f(u)$ fpr all $u \in \Omega$. If x is the unique solution to $x' = f(x)$ with $x(0) = a$ defined on the maximal interval of existence and y is the unique solution of $y' = g(y)$ with $y(0) = a$, also defined on its maximal interval of existence, show there is an increasing function, $j : \mathrm{dom}(y) \to \mathrm{dom}(x)$ such that $y(t) = x(j(t))$ for all $t \in \mathrm{dom}(y)$. Note that this means that the phase-portraits of thes two ODEs are the same.