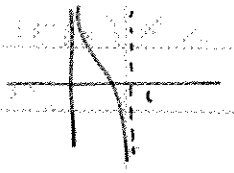
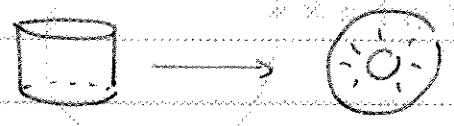
6. (a) Not homeomorphic : $[0,1]$ is compact, $(0,1)$ is not.

(b) $(0,1) \cong \mathbb{R}$ by $x \mapsto (x-\frac{1}{2})/(x^2-x)$



(c) Cylinder $\cong$ Annulus by

$(x,y,z) \mapsto (1+z)(x,y)$

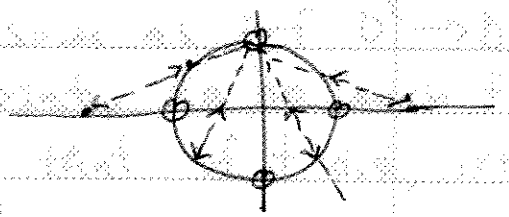


$z=0$ goes to $r=1$

$z=1$ goes to $r=2$

(d) $S^1 - \{(\pm 1,0), (0,\pm 1)\} \cong (-\infty,-1) \cup (-1,0) \cup (0,1) \cup (1,\infty)$

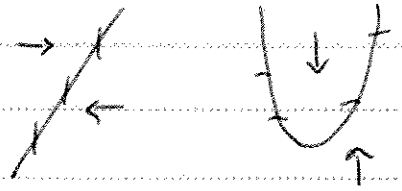
by stereographic projection

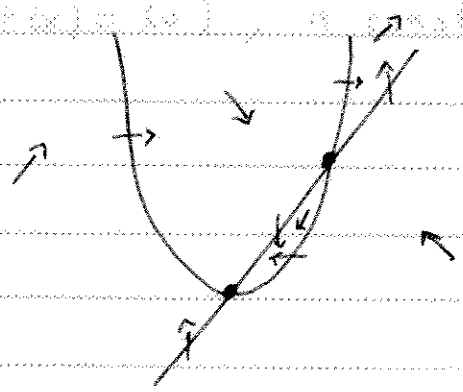


7. $V\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} y-2x \\ x^2-y \end{pmatrix}$

(a) $x' = 0$ $\quad y' = 0$

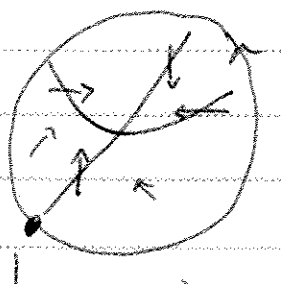
$y = 2x$ $\quad x^2 = y$



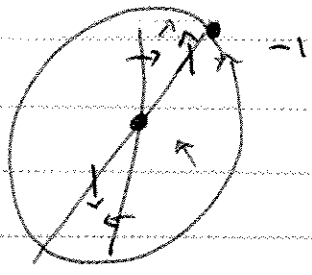


(b) $y = 2x = x^2 \Rightarrow x = 0$ or 2, so C.P. are $(0,0)$ and $(2,4)$

(c)



$+1$ $\quad (0,0)$



-1 $\quad (2,4)$

(d) $w(\gamma) = 1$ if $r < |(2,4)| = \sqrt{20}$

$w(\gamma) = 0$ if $r > \sqrt{20}$

by Poincaré's Thm