Homework 7. Due September 30

Problem 1. 7 points. For 1D motion consider a linear map

$$\begin{bmatrix} x' \\ p' \end{bmatrix} = M \begin{bmatrix} x \\ p \end{bmatrix}; M = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

(a) Find how a circle in {x,p} phase-plane is transformed into {x',p'} phase-plane? What is the area inside this figure?

(b) Find in what shape an unit square e.g. with corners at (0,0), (0,1), (1,0) and (1,1))is transformed? What is the area inside this figure?

Problem 2. 8 points. For 1D motion with a Hamiltonian

$$H = \frac{p^2}{2} + U(x)$$

draw qualitatively correct for two potentials shown in two figures below including direction of motion in each

(a)

(b)
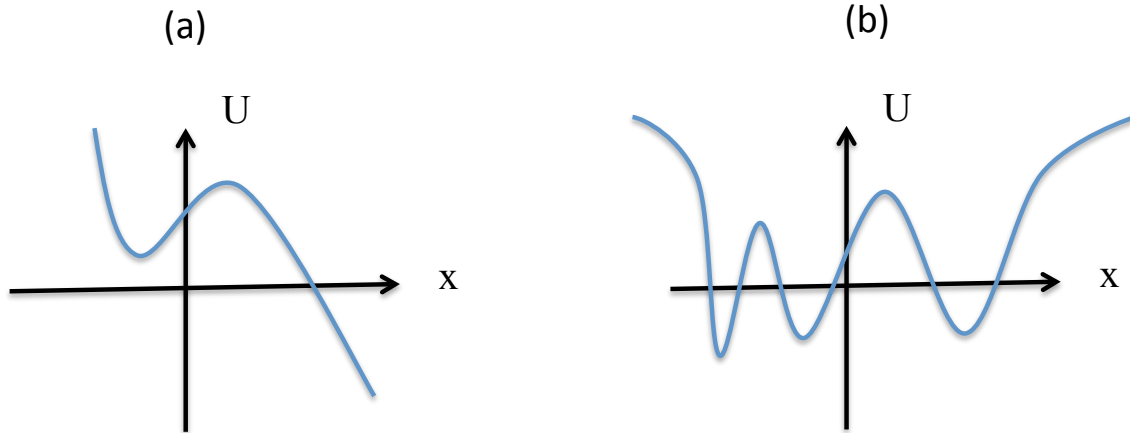
Note: start from separatrixes and then add typical trajectories between and around them.