

**Read** RHK Ch. 6; Ch. 7; Ch. 13 (13.1-13.4)  
K&K Ch. 3; Ch. 5 (5.1-5.5)  
Feynman V1 Ch. 10, Ch.14

**Solve**

From RHK	<b>Ch. 12</b>	Problems 3, 5, 7, 9, 10, 12
	<b>Ch. 13</b>	Problem 6
	<b>Ch. 7</b>	Problem 2, 6
From K&K	<b>Ch. 3</b>	Problem 3.1
	<b>Ch. 4</b>	Problem 4.2



**Problem 1.** The potential energy of a point particle is  $U(x) = -x^2 + 2x^4$ .

a) Find the force associated with this potential energy.

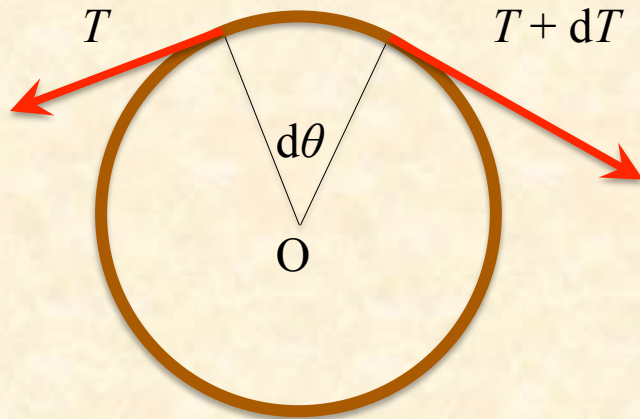
b) Sketch  $U(x)$  showing its essential features.

c) Discuss the motion for the case  $E > 0$ . Find  $v$  at  $x = 0$ , where  $E$  is the total energy of the particle.

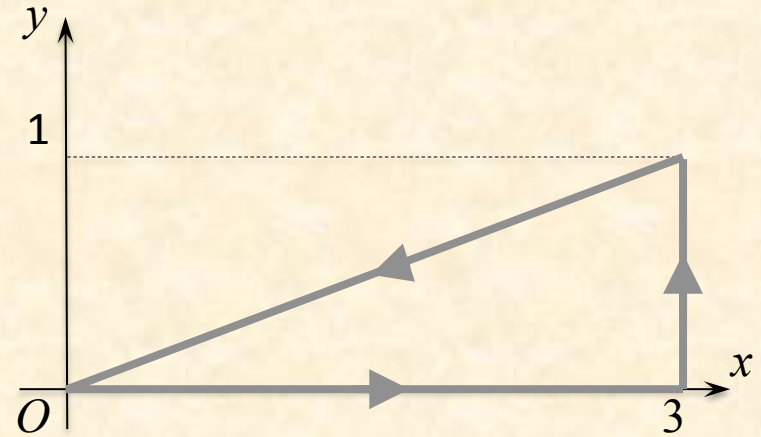
d) Discuss the motion for  $E < 0$ .

**Problem 2a.** A cord moving at low speed  $v$  rubs against a round post and deviates from a straight line by a small angle  $d\theta$ . If the tension on one side of the post is  $T + dT$  and on the other side is  $T$ , what is the difference  $dT$  introduced by friction?

**Problem 2a.** Find the ratio of tensions at the two ends of a cord wrapped around a circular post a finite angle  $\alpha$  and pulled so as to slip.



Problem 2



Problem 3

**Problem 3a.** Consider the force field  $\vec{F} = -Ar^3\hat{r}$  where  $A$  is a constant and  $\hat{r}$  is the radial unit vector. Is this force conservative? If so, find the potential energy function associated with this force.

**Problem 3b.** Repeat for the force  $\vec{F} = B(y^2\hat{i} - x^2\hat{j})$  where  $B$  is a constant. Find the work done by the force along the path shown above.