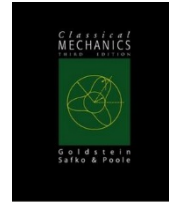*Classical Mechanics*

Chapter 10. Hamilton-Jacobi theory.
Homework 6
(Due to April 12, 2018).

Problem 6A.   **(10 points)**

Consider the physical system described by the following kinetic energy T and potential energy V

$$T = \frac{1}{2}(\dot{q}_1^2 + \dot{q}_2^2)(q_1^2 + q_2^2) \qquad V = (q_1^2 + q_2^2)^{-1}$$

Where q_1 and q_2 are the generalized coordinates.

    a) *What is the Hamilton-Jacobi equation for this system?*
    b) *Solve this equation to find Hamilton's principal function, S.*
    c) *Deduce the dynamical motion of the system*
              (you need not evaluate any definite integrals).

Problem 6B.   **(10 points)**

A particle of mass m is moving in 3D under the influence of a force field, of potential energy $V(x, y, z) = \frac{a}{2}x^2 + \frac{b}{2}z^2$, where **a** and **b** are positive constant. There is no gravitational field.

    a) *Find the Hamiltonian*
    b) *Use the Hamilton-Jacobi theory to solve the problem.*