

Physics 601, Fall 2021

Homework 1, due Monday, September 20.

1. *Problems from Goldstein, Poole & Safko*

Chapter 1: 1.10, 1.21

Chapter 2: 2.10, 2.18

2. *The Brachistochrone Problem*

A particle of mass m is constrained to move along a 2-dimensional path $y(x)$ under the influence of a conservative force that depends on height y , with potential $V(y)$. The particle begins from rest at a point (x_1, y_1) and passes through a point (x_2, y_2) .

a) Write an integral expression for the time elapsed along the trajectory from (x_1, y_1) to (x_2, y_2) .

b) Using the calculus of variations, find a differential equation for the path $y(x)$ that stationarizes the time elapsed.