

Problem Set 1

Physics 311
Classical Mechanics I

Due on Friday, September 4th, 2026

Class date: Wednesday, September 2nd, 2026.

Reading: pp. 76–85, conservation of energy and friends.

Problem 5

a. Evaluate the integral

$$I = \int \frac{dx}{1 - x^2} = \boxed{?} \quad (1)$$

One way to proceed is to note that the denominator factors $(1 - x^2) = (1 - x)(1 + x)$ and then use $1/a + 1/b = (a + b)/(ab)$ to turn one integral into two, more familiar, integrals.

b. Apropos of nothing, use your result to evaluate the definite integral

$$\int_0^x \frac{d\bar{x}}{1 - (\frac{\bar{x}}{a})^2} = \boxed{?} \quad (2)$$

Problem 6

MT 2.52. Using potential diagrams, finding escape speed, etc.