

HASHEMITE UNIVERSITY
Department of Mechanical Engineering

First Exam

Dynamics

July 3rd 2007

Name:

Problem 1:

Starting from $x = 0$ with no initial velocity, a particle is given an acceleration $a = 0.8(v^2 + 49)^{1/2}$, where a and v are expressed in ft/s^2 and ft/s , respectively. Determine

- a) The position of the particle when $v = 24 \text{ ft/s}$
- b) The speed of the particle when $x = 40 \text{ ft}$

Problem 2:

In a boat race, boat A is leading boat B by 38 m and both boats are traveling at a constant speed of 168 km/h. At $t = 0$, the boats accelerate at constant rates. Knowing that when boat B passes A, $t = 8$ s and $v_A = 228$ km/h, determine

- a) The acceleration of A
- b) The acceleration of B

Problem 3:

A 40 kg package is at rest on an incline when a force P is applied to it. Determine the magnitude of P if 4 s is required for the package to travel 10 m up the incline. The static and kinetic coefficients of friction between the package and the incline are 0.30 and 0.25, respectively.