# Exercises in Physics
## Assignment # 2

Date Given: April 14, 2022
Date Due: April 21, 2022

**P1.** (2 points) The acceleration of a particle is given by $a = 2t - 10$, where $a$ is in meters per second squared and $t$ is in seconds. Determine the velocity and displacement as functions of time. The initial displacement at $t = 0$ is $s_0 = -4\text{m}$, and the initial velocity is $v_0 = 3\text{m/s}$.

**P2.** (2 points) The acceleration of a particle is given by $a = -ks^2$, where $a$ is in meters per second squared, $k$ is a constant, and $s$ is in meters. Determine the velocity of the particle as a function of its position $s$. Evaluate your expression for $s = 5\text{m}$ if $k = 0.1\text{m}^{-1}\text{s}^{-2}$ and the initial conditions at time $t = 0$ are $s_0 = 3\text{m}$ and $v_0 = 10\text{m/s}$.

**P3.** (2 points) A sprinter reaches his maximum speed $v_{\max}$ in 2 seconds from rest with constant acceleration. He then maintains that speed and finishes the 100 meters in the overall time of 10 seconds. Determine his maximum speed $v_{\max}$.

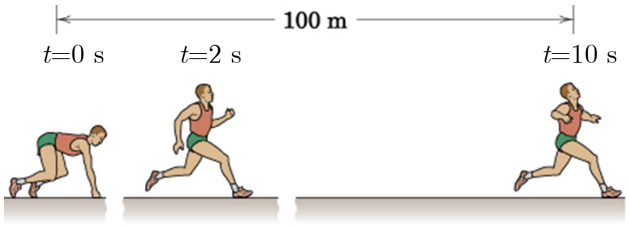


Figure 1: Illustration to Problem 3.

**P4.** (2 points) A jet car is originally traveling at a velocity of 10m/s when it is subjected to the acceleration shown. Determine the car's maximum velocity and the time $T$ when it stops.

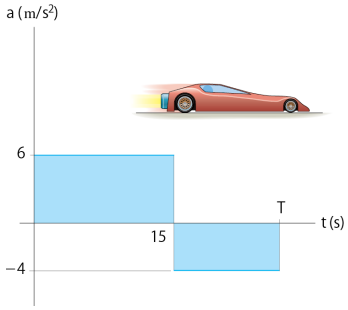


Figure 2: Illustration to Problem P4.