**Problem Set 1 (Due 3/11/2025 before class)**

**Late homework will NOT be accepted, unless you have notified the course instructor 3 days BEFORE deadline.**

**Part I (60%)**

A text on a white background

AI-generated content may be incorrect.

A math problem with numbers and equations

AI-generated content may be incorrect.

**Part II (40%) Basic Problems**

1. How fast will an object (in motion along the x-axis) be moving at t = 10 s if it had a speed of 2 m/s at t = 0 and a constant acceleration of 2 m/s?
2. A car accelerates from rest at 4 m/s2. What is the velocity of the car after 4 seconds?
3. Consider the position vs. time graph for a moving object, as shown in the figure below. At which numbered points does the object have the greatest speed?

A graph of a function

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1. See figure below (lower left) a car is moving at a constant rate along the 2 axis. Which of the following velocity vs. time graphs (lower right) describes the motion of the car? Take **right** as **positive** direction.

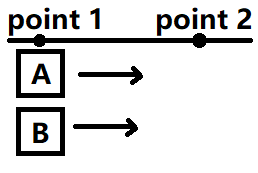
A car with a red arrow pointing to the side

AI-generated content may be incorrect. A diagram of a graph

AI-generated content may be incorrect.

1. A car is rolling toward a cliff with an initial speed of 15 m/s. The maximum negative acceleration that the brakes can provide is -0.3 m/s. If the cliff is 350 m from the initial position of the car, will the car go over the cliff?
2. Cart A moves with a uniform speed past point 1 on a straight track at 0.3 m/s. At the same time, Cart B moves past point 1 at 0.1 m/s but is uniformly accelerating at 0.1 m/s. Point 2 is 1.0 m past point 1. Which cart gets to point 2 first?

Scheme:



1. A small ball is released from a window at t = 0. Assuming free-fall conditions, how far does it travel in 2.8 seconds? If the ball had more mass would it fall a greater distance?
2. A car moving at 20 m/s passes a street corner. The car maintains this speed even though the speed limit is 10 m/s. The police car that was sitting at the corner begins to chase the car by accelerating at 2 m/s. How long will it take for the police car to catch the speeder? How far from the corner is the catch-up point? How fast will the police car be traveling at that time?
3. Determine the distance between two steel spheres (after 1.4 s) dropped from a tower if the second sphere was dropped 0.5 seconds after the first. Assume free-fall and that the spheres are dropped from rest.
4. A car accelerates uniformly from rest to a velocity of 101 km/h east in 8.0 s. What is the magnitude of its acceleration?