SP211 Lab Exercise #1: One Dimensional Kinematics

Part I. Pre-Lab Homework Problem

A. Consider the following situation:
   At time \( t = 0 \), you are at rest at \( x = 1.0 \) m.
   At \( t = 1.0 \) s, you begin walking away from origin with constant speed 1.0 m/s.
   At \( t = 3.0 \) s, you stop.
   At \( t = 6.0 \) s, you begin walking toward origin with constant speed 0.5 m/s
   At \( t = 8.0 \) s, you stop, and
   At \( t = 9.0 \) s, the experiment ends.

Sketch graphs of \( x \) vs \( t \), of \( v \) vs \( t \), and of \( a \) vs \( t \) for this situation, for \( 0 < t < 10 \) s.
To facilitate comparison, please use the same time scale for all three graphs, and align the vertical axes.

B. At \( t = 0 \) in this situation, a dynamics cart is at rest at position \( x = 0.25 \) m. At time \( t = 1.0 \) s, the cart begins to accelerate with constant acceleration 0.1 m/s\(^2\). The cart is stopped abruptly at \( t = 6 \) s.

Sketch graphs of \( a \) vs \( t \), of \( v \) vs \( t \), and of \( x \) vs \( t \) for this situation, for \( 0 < t < 8 \).
As in part (A) above, please use the same time scale for all three graphs, and align the vertical axes.