

Question 1:

Answer the following True/False questions (**Assume [East] is positive**)

1. An object under uniform motion has a
 - (a) Non-zero average acceleration in the positive direction (T / F)
 - (b) Zero average acceleration (T / F)
2. De-acceleration is just acceleration in the same direction of motion (T / F)
3. Suppose that a bullet accelerates at $\vec{a}_{av} = +1.068 \text{ km/s}^2$ from rest to a final velocity of $\vec{v}_f = +356 \text{ m/s}$. Then,
 - (a) The time elapsed was $\Delta t = 3 \text{ s}$
 - (b) If I double the acceleration of the bullet, then Δt doubles as well. (T / F)
4. Suppose a Velocity V. Time plot is represented by $y = 2x + 4$,
 - (a) The average acceleration is uniform (T / F)
 - (b) The initial velocity of the body at $t = 0$ was $\vec{v}_i = +4 \text{ m/s}$ (T / F)
 - (c) The displacement over the time interval $[0, 2]$ was $\Delta \vec{d} = +12 \text{ m}$ (T / F)
 - (d) The average acceleration is $\vec{a}_{av} = +2 \text{ m/s}^2$ (T / F)
5. A secant line on a Velocity V. Time graph over the interval $[t_1, t_2]$ gives me the instantaneous acceleration over the time interval $[t_1, t_2]$. (T / F)
6. Suppose a Position V. Time plot is represented by $y = x^2 + 4$. Then,
 - (a) The object is slowing down in the positive direction. (T / F)
 - (b) The object is experiencing uniform motion. (T / F)
 - (c) The object may be experiencing uniform acceleration (T / F).
 - (d) The initial position vector of the object at $t = 0$ is $\vec{d}_i = 2 \text{ m}$
7. Suppose that the tangent line to a Position V. Time plot at $t = 4$ was represented by the equation $y = -3x + 7$. Then,
 - (a) The instantaneous velocity of the object at $t = 4$ was $\vec{v} = +3 \text{ m/s}$
 - (b) The instantaneous velocity of the object at $t = 5$ was $\vec{v} = -3 \text{ m/s}$
 - (c) Suppose that the Velocity V. Time plot for the object happened to be linear, then the average velocity of the object must have been $\vec{v}_{av} = -3 \text{ m/s}$. (T / F)
8. Suppose a Velocity V. Time plot is represented by $y = -x + 3$, then the displacement over the time interval $[0, 8]$ is $\Delta \vec{d} = +0 \text{ m}$. (T / F)
9. Suppose that the average acceleration of an object in motion differs at two distinct points in time, then the Velocity V. Time graph must have been linear. (T / F)

Question 2:

A car is initially traveling at an initial velocity $\vec{v}_i = 412 \text{ m/s [East]}$. The car then de-accelerates at an average acceleration of \vec{a}_{av} to come to a rest at a red light over a duration of Δt . When the light turns green, the car accelerates at an average acceleration $-\vec{a}_{av}$ over a time period $2\Delta t$, to reach a final velocity of $\vec{v}_f = 240 \text{ m/s [East]}$. Determine the the average acceleration \vec{a}_{av} .

(Hint: Setup the correct equations to get rid of Δt)

Question 3:

Given below is the Velocity V . Time graph for an object in motion,