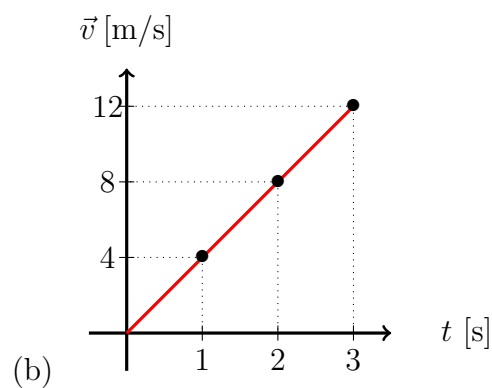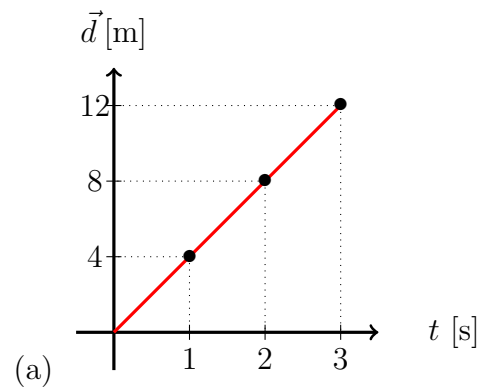# Assignment 2

September 30, 2022

Q1 Use both vector scale graphs and algebraic calculation to determine the total displacement:

(a) $\vec{\Delta d_1} = 3m \ [W]$, $\vec{\Delta d_2} = 5m \ [E]$

(b) $\vec{\Delta d_1} = 2m \ [S]$, $\vec{\Delta d_2} = 5m \ [N]$, $\vec{\Delta d_1} = 7m \ [S]$

Q2 Determine the (a) Total Displacement and (b) Acceleration of the motion from the figures below from 0s to 3s:

(a)

(b)

HINT: Look at the units carefully.

Q3 You are a forensic scientist, and you were trying to determine how fast a bullet can travel. On a test fire, you measured a bullet accelerated to 120 m/s from rest in 1.3×10^{-2} [s]. What is the acceleration of the bullet?

Q4 A squash ball with an initial velocity of 25 m/s [W] is hit by a squash racket, changing its velocity to 29 m/s [E] in 0.25s.

   (a) What is the squash ball's average acceleration?
   (b) Assume the acceleration is constant, what is the displacement of the ball in this 0.25s time interval?
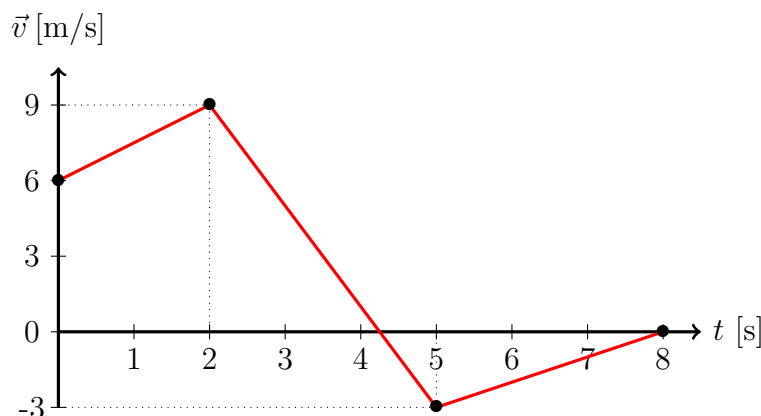
Q5 Determine the total displacement and average velocity of the motion illustrated below from:

   • $t = 0\,\text{s}$ to $t = 8\,\text{s}$
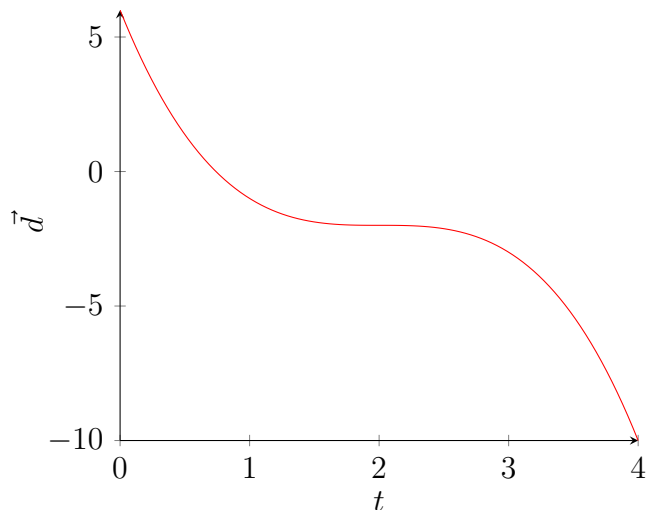   • $t = 1\,\text{s}$ to $t = 7\,\text{s}$
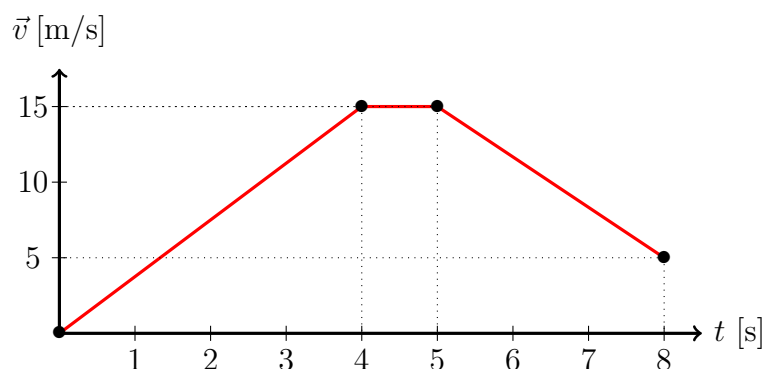
Note: Positive is defined to be the "positive" direction.

Q6 Determine the total displacement and average velocity of the motion illustrated below from 0s - 8s

Note: Positive is defined to be the "positive" direction.

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Q7 Determine the type of the motion from graph below:

Q8 A car on the highway is traveling at $110\,\text{km/h}[\text{N}]$ and experiences an acceleration of $0.5\,\text{m/s}^2[\text{N}]$.

(a) What will the final velocity of the car be in $5\,\text{s}$?

(b) What will the displacement of the car be if it travels for $5\,\text{s}$?

Q9 A plane is cruising at $900\,\text{km/h}[\text{S}]$, and is slowing down to approach for landing. Experiencing an acceleration of $10\,\text{m/s}^2[\text{N}]$,

(a) how fast would the plane be after $3\,\text{s}$?

(b) how much distance will the plane traverse in that $3\,\text{s}$ interval?

Bonus: What is the total displacement of the motion described below from 0s to 3s:

(a) $\vec{a}(t) = t + 3$, $\vec{v}_o = 0$

(b) $\vec{v}(t) = 46.798 \sin \frac{2\pi}{3} t$. Do not take an integral.

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