Question 1:

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

1. A runner completes a 100 m sprint at an average speed of 50 m/ s.
   (a) The time it took to complete the race was 10 s. (T / F)
   (b) If the runner wishes to complete a 1 km race in the same amount of time as he completed the 100 m race, his average speed must be 500 m/ s. (T / F)
2. The position v. time plot of a vehicle over the highway was similar to the plot $y = x$.
   (a) The vehicle experienced uniform motion (T / F)
   (b) The average velocity was positive (T / F)
3. The position v. time plot of a vehicle over the highway was similar to the plot $y = -4$
   (a) The vehicle experienced uniform motion (T / F)
   (b) The vehicle is [East] of the reference point (T / F)
4. Two runners compete in a race starting from $(0, 0)$, runner X and runner Y. Runner X has a Pos v. Time plot similar to $y = 4x$ and Runner Y has a Pos v. Time plot similar to $y = x$.
   (a) Runner Y won the race (T / F)
   (b) If the race lasted 4 seconds, then final position vector of Runner X was $\vec{d}_X = 12\,\text{m}$[East] (T / F)

Question 2:

Using the $x-$dimensional coordinate system, and choosing $(x \rightarrow)$ as the positive direction, I decided to track my tour around the area the other day. All position vectors are recorded relative to $(0, 0)$. I began my journey at $d_1 = +5\,\text{m}$, then,

- $\vec{d_2} = +7\,\text{m}$
- $\vec{d_3} = -18\,\text{m}$
- $\vec{d_4} = +11\,\text{m}$

If the tour lasted for 10 min, determine my average velocity as well as my average speed over the tour.

Question 3:

A tourist traverses 412 km[W] to the Canada starting from UK. From Canada, he traverses 805 km[E] to Egypt. Finally, from Egypt he traverses 98 km[E] to Saudi Arabia. If the journey took 2 h, determine his average velocity as well as his average speed.

Question 4:

Racer X, Racer Y and Racer Z compete in the Grand Motor Sport. Below is position v. time plot for each of the racers, Racer X,Racer Y,Racer Z. Prove that Racer Z won the race.(Assume that the race lasted for 5 seconds)

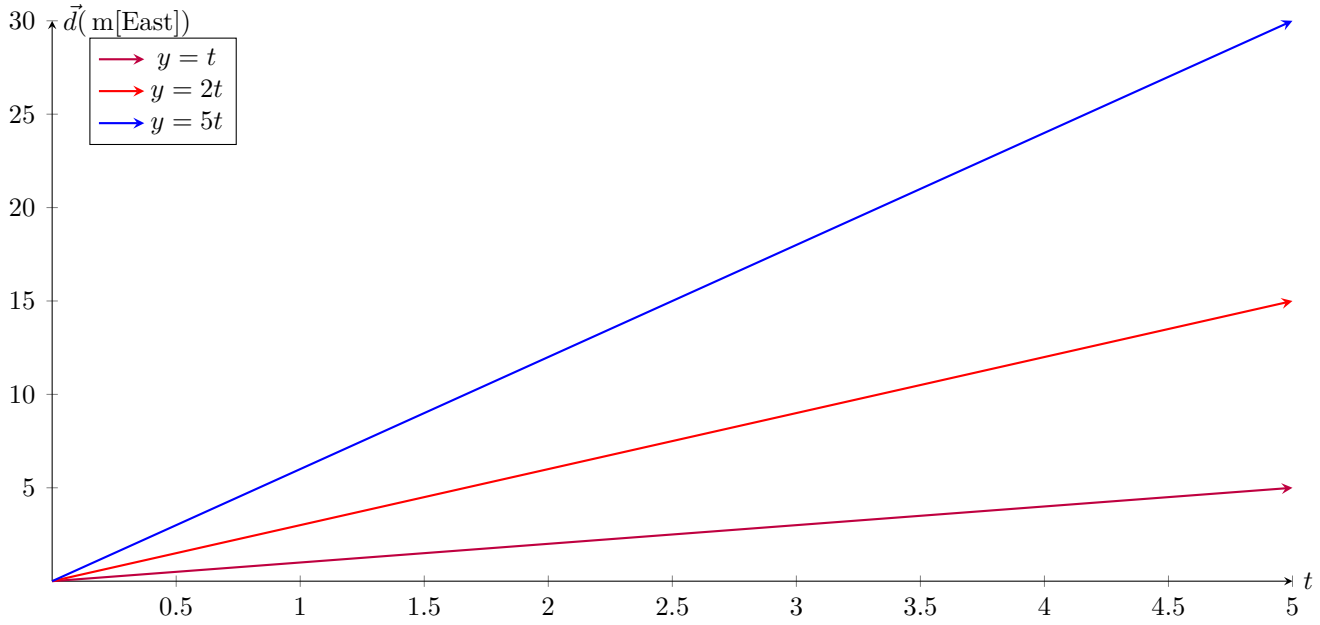

Figure 4.1: Pos V. Time

Question 5:

A ball is dropped from a cliff 20 m[North] relative to the ground. The ball bounces off the ground and reaches a final position 15 m[South] relative to the cliff. The entire trip took 12 seconds. Determine,

(a) The average velocity of the ball

(b) The average speed of the ball

(c) The Pos v. Time plot of the ball

Question 6:

A sprinter completes a sprint (returning back to his starting position) in 30 seconds around a circular track with radius 15 m. Compute the sprinters,

(a) Average speed

(b) Average velocity

Question 7:

Car A and Car B are about to race each other, however Car B wants to challenge himself by letting car A have a 3 second head start. If car A has an average speed of $120\,\mathrm{m/s}$, at what average speed must Car B race at in order to tie the race? The length of the race track is $4.2\,\mathrm{km}$.

Question 8:

The Robetson's Family are interested in doing business with a particular salesmen. They decide to drive over to Toronto to catch him at his bus stop before he departs. Let us suppose that this bus stop is located at $(0, 0)$. The Roberston's mistakenly passed this bus stop, not knowing that the salesmen was at this particular one, and only realized they missed him after having traveled to a position $\vec{d} = +100\,\text{m}$ relative to the bus stop, at an average speed of $60\,\text{m/s}$. The exact moment they passed him was the moment that his bus started to travel in a direction [West] relative to the bust stop at an average velocity of $50\,\text{m/s}$[West]. If at the exact moment the Robertson's had reached the position $\vec{d} = +100\,\text{m}$, the salesmen got off at his next stop, at what speed must the Roberston's travel at in order to catch up to him within 30 seconds?