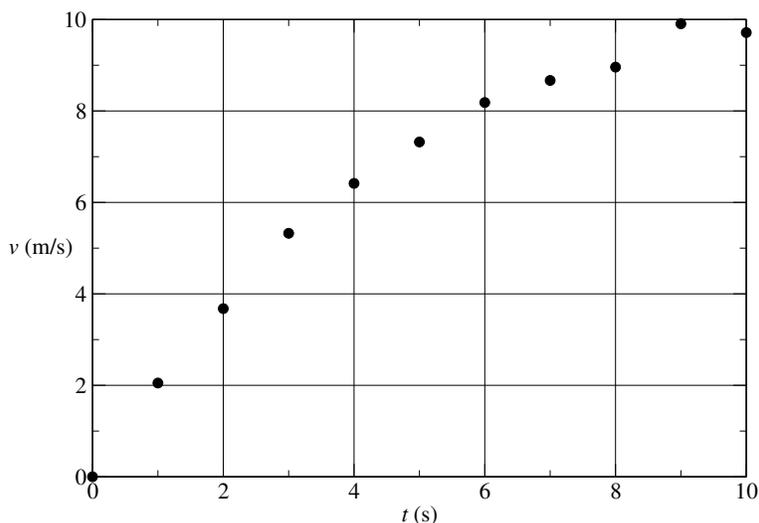


Problem Set #2

Physics 131

31 August 2022

1. A boat sails in a straight line for 30 minutes at 20 kph and for the next 30 minutes at 30 kph. What is the average speed of the boat during that hour? Did you get 25 kph? Why or why not?
2. Suppose the boat in the previous problem travels 30 km at 20 kph and then another 30 km at 30 kph. What is the average speed of the boat during the 60-km straight-line trip? Did you get 25 kph? Why or why not?
3. You've got a dream to one day compete in the Tour de France. You locate a great 50-km straight stretch of road in the western part of the US that runs east-west. You begin your training on the west end of the road. After biking the entire 50 km, you note that it took you 79 minutes to reach the east end. You immediately turn around and bike 25 km toward your starting point before stopping for a lunch break. That latter 25 km took you 47 minutes.
 - (a) What was your average speed up until your lunch break?
 - (b) What was your average velocity up until your lunch break?
4. An athlete begins training for the 100-m sprint. She has a scientist measure her velocity as a function of time. The figure below shows the scientist's data.



- (a) Is the athlete's acceleration constant for the entire 10 s of data taking? If so, why? If not, why not?
 - (b) If you answered "yes" to the previous part, calculate the acceleration (in m/s^2). If you answered "no," determine the acceleration (in m/s^2) during a time interval for which the acceleration is approximately constant.
5. Danica Patrick's win at the 2008 Indy Japan 300 marked the first time a woman won a National Championship-level open wheel race. The Twin Ring Motegi race track was the venue for Patrick's historic win. The oval there is 1.52 miles long. Patrick won the 200-lap race in a time of 1 hour 51 minutes 2.6739 seconds.
 - (a) Despite the Indy Japan 300 name, what was the total distance of the race? Give your answer in miles.
 - (b) What was Patrick's average speed? Give your answer in both mph and kph.
 - (c) What was Patrick's average velocity?

Due date: **7 September 2022** (*beginning of class*)