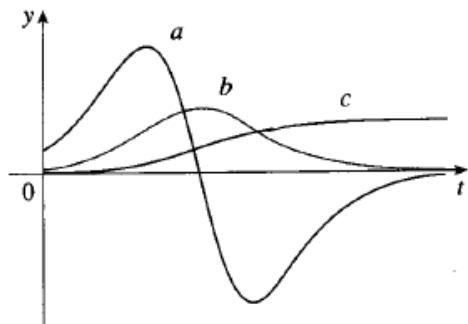


Due at the start of lecture on Thurs Mar 5, 2009.

Answer the following questions in groups of two, but turn in one solution sheet per student. Write neatly and orderly as points will be deducted for messy work. No work shown  $\Rightarrow$  partial/full credit not possible, so show as much work as possible.

- Let  $s_A(t) = 15t^2 + 10t + 20$  miles and  $s_B(t) = 5t^2 + 40t$  miles be the position functions of cars  $A$  and  $B$  that are moving along parallel straight lanes of a highway, where  $t \geq 0$  is in hours.
  - At what instant of time do the cars have the same velocity?
  - Which car is ahead at the time the cars have the same velocity?
- A car is traveling at 88 ft/s when the driver applies the brakes to avoid hitting a child. After  $t$  seconds, the car is  $s(t) = 88t - 8t^2$  feet from the point where the brakes were first applied.
  - How long does it take for the car to come to a stop?
  - How far does the car travel before stopping?
- An object thrown vertically upwards (on Earth) with a velocity of  $v_0$  ft/s from a height of  $h_0$  ft has height  $h(t) = -16t^2 + v_0t + h_0$  ft at time  $t$  seconds.
  - Nolan Ryan, one of the fastest baseball pitchers of all time, was capable of throwing a baseball 150 ft/s (over 102 mi/h). During his career, he had the opportunity to pitch in the Houston Astrodome. The Astrodome was an indoor stadium with a ceiling 208 ft high. Could Nolan Ryan have hit the ceiling of the Astrodome if he were capable of giving the baseball an upward velocity of 100 ft/s from a height of 7 ft?
  - How fast would Nolan Ryan have to throw a ball upward from a height of 7 ft in order to hit the ceiling of the Astrodome?
- Recall the formula for height in the previous question. In 1939, Joe Sprinz, of the San Francisco Seals Baseball Club, attempted to catch a ball dropped from a blimp at a height of 800 ft (for the purpose of setting a record).
  - How long does it take for a ball to drop 800 ft?
  - What is the velocity of a ball in mi/hr after an 800-ft drop? ( $88 \text{ ft/s} = 60 \text{ mi/h}$ )

(Note: Even with the slowing effect of wind resistance, the impact of the ball slammed Sprinz' glove into his face, fractured his upper jaw in 12 places, broke 5 teeth, and knocked him unconscious, and..... he dropped the ball.)
- The figure below shows the graphs of three functions. One is the position function of a car, one is the velocity of the car, and one is its acceleration. Identify each curve and explain your choices.



- Reread all study techniques from earlier worksheets and use one of them in your study in the next 7 days.