

## Suggested problems Chapter 02

The quiz questions will be same or very similar to the following text-book problems.

Refer to the course website for the latest version of this document.

You are encouraged to seek the help of your instructor during his office hours.

5. The position of an object moving along an  $x$  axis is given by  $x = 3t - 4t^2 + t^3$ , where  $x$  is in meters and  $t$  in seconds. Find the position of the object at the following values of  $t$ : (a) 1 s, (b) 2 s, (c) 3 s, and (d) 4 s. (e) What is the object's displacement between  $t = 0$  and  $t = 4$  s? (f) What is its average velocity for the time interval from  $t = 2$  s to  $t = 4$  s? (g) Graph  $x$  versus  $t$  for  $0 \leq t \leq 4$  s and indicate how the answer for (f) can be found on the graph.

Answer: (a) 0 (b)  $-2$  m ; (c) 0; (d) 12 m (e) + 12 m (f) + 7 m

15. The displacement of a particle moving along an  $x$  axis is given by  $x = 18t + 5.0t^2$ , where  $x$  is in meters and  $t$  is in seconds. Calculate (a) the instantaneous velocity at  $t = 2.0$  s and (b) the average velocity between  $t = 2.0$  s and  $t = 3.0$  s.?

Answer: (a) 38 m/s; (b) 43 m/s

18. The position of a particle moving along an  $x$  axis is given by  $x = 12t^2 - 2t^3$ , where  $x$  is in meters and  $t$  is in seconds. Determine (a) the position, (b) the velocity, and (c) the acceleration of the particle at  $t = 3.0$  s. (d) What is the maximum positive coordinate reached by the particle and (e) at what time is it reached? (f) What is the maximum positive velocity reached by the particle and (g) at what time is it reached? (h) What is the acceleration of the particle at the instant the particle is not moving (other than at  $t = 0$ )? (i) Determine the average velocity of the particle between  $t = 0$  and  $t = 3$  s.

Answer: (a) + 61 m; (b) +11 m/s ; (c)  $-18$  m/s<sup>2</sup>; (d) +64 m; (e) 4.0 s; (f) +24 m/s; (g) 2.0 s; (h)  $-24$  m/s<sup>2</sup>; (i) + 18 m/s

25. A particle confined to motion along an  $x$  axis moves with constant acceleration from  $x = 2.0$  m to  $x = 8.0$  m during a 2.5 s time interval. The velocity of the particle at  $x = 8.0$  m is 2.8 m/s. What is the constant acceleration during this time interval?

Answer: 0.32 m/s<sup>2</sup>

33. A stone is thrown from the top of a building with an initial velocity of 20 m/s downward. The top of the building is 60 m above the ground. How much time elapses between the instant of release and the instant of impact with the ground?

Answer: 2.0