

Post class assignment:

Solve the following problems:

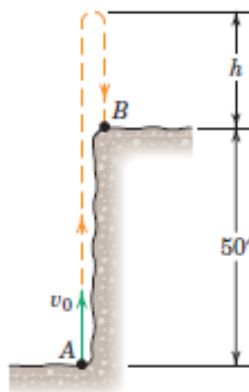
2/2 The displacement of a particle is given by $s = 2t^3 - 30t^2 + 100t - 50$, where s is in feet and t is in seconds. Plot the displacement, velocity, and acceleration as functions of time for the first 12 seconds of motion. Determine the time at which the velocity is zero.

2/3 The velocity of a particle which moves along the s -axis is given by $v = 2 + 5t^{3/2}$, where t is in seconds and v is in meters per second. Evaluate the displacement s , velocity v , and acceleration a when $t = 4$ s. The particle is at the origin $s = 0$ when $t = 0$.

2/4 The velocity of a particle along the s -axis is given by $v = 5s^{3/2}$, where s is in millimeters and v is in millimeters per second. Determine the acceleration when s is 2 millimeters.

2/12 A projectile is fired vertically with an initial velocity of 200 m/s. Calculate the maximum altitude h reached by the projectile and the time t after firing for it to return to the ground. Neglect air resistance and take the gravitational acceleration to be constant at 9.81 m/s^2 .

2/13 A ball is thrown vertically upward with an initial speed of 80 ft/sec from the base A of a 50-ft cliff. Determine the distance h by which the ball clears the top of the cliff and the time t after release for the ball to land at B . Also, calculate the impact velocity v_B . Neglect air resistance and the small horizontal motion of the ball.



Problem 2/13

- 2/59** At time $t = 0$, the position vector of a particle moving in the x - y plane is $\mathbf{r} = 5\mathbf{i}$ m. By time $t = 0.02$ s, its position vector has become $5.11\mathbf{i} + 0.4\mathbf{j}$ m. Determine the magnitude v_{av} of its average velocity during this interval and the angle θ made by the average velocity with the positive x -axis.
- 2/60** A particle moving in the x - y plane has a velocity at time $t = 6$ s given by $4\mathbf{i} + 5\mathbf{j}$ m/s, and at $t = 6.1$ s its velocity has become $4.31\mathbf{i} + 5.4\mathbf{j}$ m/s. Calculate the magnitude a_{av} of its average acceleration during the 0.1-s interval and the angle θ it makes with the x -axis.
- 2/61** The velocity of a particle moving in the x - y plane is given by $6.12\mathbf{i} + 3.24\mathbf{j}$ m/s at time $t = 3.65$ s. Its average acceleration during the next 0.02 s is $4\mathbf{i} + 6\mathbf{j}$ m/s². Determine the velocity \mathbf{v} of the particle at $t = 3.67$ s and the angle θ between the average-acceleration vector and the velocity vector at $t = 3.67$ s.
- 2/62** A particle which moves with curvilinear motion has coordinates in millimeters which vary with the time t in seconds according to $x = 2t^2 - 4t$ and $y = 3t^2 - \frac{1}{3}t^3$. Determine the magnitudes of the velocity \mathbf{v} and acceleration \mathbf{a} and the angles which these vectors make with the x -axis when $t = 2$ s.