1. Given the acceleration \( a = 32 \), initial velocity \( v(0) = 20 \) and initial position \( s(0) = 0 \). Find the body’s position at time \( t \).

2. A rock thrown vertically upward from ground reaches a height of \( s = 128t - 16t^2 \). How high does the rock go? What are the velocity and speed of the rock when it is 240 ft above the ground on the way up and on the way down?

3. The following graph shows the velocity \( v = \frac{ds}{dt} \) (m/sec) of a body moving along a coordinate line.

![Graph of velocity vs. time]

a. When does the body reverse direction?
b. When is the body speeding up and slowing down?
c. Graph the body’s speed and acceleration.

4. Find the derivative of the following functions:
   a. \( y = (7x^3 - 4x + 2)(2x + 3)^4 \)
   b. \( y = (6x + 1) \csc^2 x \)
   c. \( y = \left(\frac{\sin x}{1+\cos x}\right)^2 \)
   d. \( y = \sqrt{\tan x} \)
   e. \( y = \cot(\sec(2x - 1)) \)

5. Find the tangent to the curve at the given point.
   a. \( x^2 + xy - y^2 = 1, \quad (2, 3) \)
   b. \( y^2 - 2x - 4y - 1 = 0, \quad (-2, 1) \)

6. A balloon is raising vertically above a level, straight road at a constant rate of 1 ft/sec. Just when the balloon is 65 ft above the ground, a bicycle moving at a constant rate of 17 ft/sec passes under it. How fast is the distance \( s(t) \) between the bicycle and balloon increasing 3 sec later?

7. Water is drained from a conical tank at the rate \( 7 \text{ ft}^3/\text{min} \). The tank stands point down and has a height of 10 ft and a base radius of 5 ft. What is the rate of change of the water level when the water is 4 ft deep?

8. Find \( dy \) if \( y = x^2\sqrt{1-x} \).

9. Find \( dy \) if \( y = \cos(x^2) \).

10. The radius of a sphere is increased from 5 to 5.05 m. Use differentials to estimate the resulting change in volume and surface area. Estimate the resulting volume and surface area.

11. Find the absolute maximum and minimum values of \( f(x) = 2x^3 + 3x^2 - 12x + 4 \) for \(-4 \leq x \leq 2\).

12. Given \( y = x(6 - 2x)^2 \). Find intervals on which \( y \) is increasing and decreasing. Find all local extrema. Find intervals on which \( y \) is concave up and concave down. Graph the function and include any local extreme points and inflection points.