1. An object that falls freely in a vacuum, close to the surface of the earth has a constant acceleration of 

\[ g = 9.81 \frac{m}{s^2} = 32 \frac{ft}{sec^2} \]

If the object is dropped from rest, find its velocity and the distance it has traveled \( t \) seconds after it was released.

2. Approximate the area under the parabola \( y = x^2 \) from 0 to 1 using four subintervals with left endpoints.

3. Use parts a) and b.) to find the area of the region bounded by the graph of \( y = x^2 \), \( y = 0 \) between \( x = 0 \) and \( x = 4 \).
   a) Approximate the area using \( n \) intervals and left end points.
   b) Find the limit of the approximation as \( n \to \infty \) in part (a) above to find the area of the region.

4. Evaluate the following sums:
   a) \[ \sum_{i=1}^{n} 9 \]
   b) \[ \sum_{i=1}^{1053} 9 \]
   c) \[ \sum_{i=34}^{876} 9 \]
   d) \[ \sum_{i=1}^{50} i(2i + 3) \]
   e) \[ \sum_{i=1}^{60} (5i - i^2) \]
   f) \[ \sum_{i=1}^{30} (5i - i^2) \]
   g) \[ \sum_{i=1}^{17} (5i - i^2) \]
   h) \[ \sum_{i=1}^{30} \ln(i+2) - \ln(i+1) \]
   i) \[ \sum_{i=1}^{n} \cos(\pi i) \]
   j) \[ \sum_{i=1}^{17} \cos(\pi i) \]

5. Prove that \[ \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{6} \]

6. Evaluate the following sums.
   a) \[ 1 + 2 + 3 + 4 + 5 \cdots + 75 \]
   b) \[ 151 + 152 + 153 + \cdots + 364 \]
   c) \[ 1 + 2 + 3 + 4 + \cdots + 2,074,804 \]
   d) \[ 1.2^6 + 1.1^7 + 1.1^8 + \cdots + 1.1^{200} \]

7. Sketch the graph of \( y = 3x^2 + 2 \) on the interval \([0, 1]\). Consider the area of the region below the graph and above the interval \([0, 1]\). Use the limit definition of a definite integral to find the exact area of the region.

8. Use the limit definition of a definite integral to evaluate \( \int_{-1}^{2} (x^2 - 2x + 1)dx \)

9. Differentiate:
   a.) \( F(x) = \int_{-1}^{3x} \sqrt{1+t^2}dt \)
   b.) \( F(x) = \int_{\tan x}^{\sec x} 5t^2 dt \)

10. Find an equation of the line perpendicular to the graph of
    a.) \( F(x) = 3 + \int_{0}^{2} 2e^t \ dt \) at \( x = 0 \)
    b.) \( F(x) = \int_{2x}^{x^2} \sqrt{t^3 + 5}dt \) at \( x = 2 \)