1. Find the equation of the tangent plane to the graph of \( f(x,y) = 3x^2y + 6x - e^y \) at the point \((1,0)\). 

2. Find. 
   a) \( \int \left(e^3 + \sin(\pi x) - \frac{x^3}{3}\right) dx \) 
   b) \( \frac{d}{dx} \left( \frac{x}{\ln x} - 6e^x \right) \) 
   c) \( \frac{\partial}{\partial y} \left( 2x^3y + 7y^2 + 12x - 3 \right) \) 

3. Squirrels are introduced onto an island, which can support a maximal population of 3000 squirrels. Initially there were 100 squirrels, and the population described by the logistic equation was increasing at a rate of 30 per month. 
   a) Find the population at time \( t \). 
   b) How long does it take the population to reach half of the maximum? 

4. A car travels along a route 350 miles long in 7 hours. The speed of the car is 60 mph for the first 2 hours, and it travels 80 miles in the next 2 hours. It travels at a constant speed for the remaining part of the journey. How long has the car travelled after 5 hours? 

5. Water flows out of a full 16000 gallon tank at a rate of \( 6t^2 \) gallons per hour \( t \) hours after the valve started opening. 
   a) How much water flows out in the first 5 hours? 
   b) How long does it take the tank to empty?