Assignment 3

1. Consider the following system of linear equations:
   
   \[ \begin{align*}
   2x + 3y &= 7 \\
   4x - y &= 5 
   \end{align*} \]

   Solve the system using Gaussian elimination or any other appropriate method.

2. The temperature of a certain object is given by the function
   \[ T(t) = 20 + 10\sin(\frac{\pi t}{6}) \]
   where \( t \) is the time in minutes. Find the time at which the temperature is a maximum.

3. A particle moves along a straight line with position \( s(t) \) at time \( t \). If \( s(t) = 3t^2 - 2t + 1 \), find the velocity and acceleration of the particle at \( t = 2 \).

4. Consider the function \( f(x) = \sqrt{x} \) and \( g(x) = x^2 - 4 \). Determine the domain and range of the composite function \( f \circ g \).

5. A company manufactures two products, A and B. The profit from producing \( x \) units of A and \( y \) units of B is given by the function
   \[ P(x, y) = 5x + 3y \]
   where \( P \) is in thousands of dollars. If the company needs to produce at least 10 units of A and at least 5 units of B, find the minimum profit.

6. The relationship between the demand and supply of a product is given by the equations
   \[ D(p) = 100 - 2p \quad \text{and} \quad S(p) = 20 + 3p \]
   where \( D(p) \) and \( S(p) \) are the demand and supply functions, respectively, measured in units. Find the equilibrium price and quantity.