Assignment 5

1. Let f(x) = x^2
   a) Find the equation of the tangent line to the curve f(x) = x^2 at the point where x = 2
   b) Find the derivative of f(x) = x^2
   c) Determine the critical points of f(x) = x^2

2. Solve the following system of equations:
   a) 2x + 3y = 5
   b) 4x - y = 7
   c) x^2 + y^2 = 25

3. A company produces two products, A and B. The profit from product A is $5 per unit and from product B is $7 per unit. The company has a total of 100 units of resource available. If the company wants to maximize its profit, how many units of each product should it produce?

4. A rectangle has a perimeter of 20 units. What is the maximum area that the rectangle can have?

5. A ball is dropped from a height of 100 meters. The height h(t) of the ball at time t is given by:
   h(t) = 100 - 4.9t^2
   a) What is the velocity of the ball after 2 seconds?
   b) At what time does the ball hit the ground?

6. Find the equation of the line that is perpendicular to the line y = 2x + 3 and passes through the point (1, 2).

7. Solve the following differential equation:
   dy/dx = x^2 + 2x + 1
   y(0) = 2

8. A right triangle has legs of length 3 units and 4 units. Find the length of the hypotenuse.

9. A body is dropped from a height of 100 meters. The height h(t) of the body at time t is given by:
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   a) What is the velocity of the body after 2 seconds?
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