Warm-up Problems

1. Determine the area of the largest rectangle that can be inscribed in a circle of radius 4.

2. Determine the cylinder with the largest volume that can be inscribed in a cone of height 8 and base radius 4 cm.

3. Find the dimensions of the rectangle of largest area that has its base on the x-axis and its other two vertices above the x-axis and lying on the parabola \( y = 9x^2 \).

Lecture Problems

4. Find the function \( f(x) \) that satisfies the given information.
   
   (a) \( f'(x) = -25 \sin(5x) \), \( f(0) = -3 \).
   
   (b) \( f''(x) = -25 \sin(5x) \), \( f'(0) = -4 \) and \( f(0) = -3 \).
   
   (c) \( f'(x) = x^3 - 3x \), \( f(0) = 1 \)
   
   (d) \( f'(x) = x^3 - 3x \), \( f(1) = 13 \)
   
   (e) \( f'(x) = 6x^2 + 8x - 1 \), \( f(0) = 6 \).
   
   (f) \( f'(x) = 6x^2 + 8x - 1 \), \( f(0) = 6 \) and \( f(1) = 11 \)
   
   (g) \( f'(x) = 6x^2 + 8x - 1 \), \( f(0) = 6 \) and \( f(1) = 12 \)