Warm-up Problems

1. Find the derivatives.
   (a) \( \frac{d}{dx}(x) = \)
   (b) \( \frac{d}{dx}(y) = \)

2. The equation of the unit circle is \( x^2 + y^2 = 1 \). Find the equation of the line tangent to the unit circle when \( x = 0 \).

3. Find the derivative of \( y = \sqrt{1-x^2} \).

Lecture Problems

4. Use implicit differentiation.
   (a) \( 10x^2 + y^2 = 25 \). \( y' = \)
   (b) \( x^3 + y^3 = 4 \). \( y' = \)
   (c) \( 3\sin(x+y) = x \). \( y' = \)
   (d) \( x^3y^5 + 3x = 8y^3 + 1 \). \( y' = \)

5. Find \( y'' \) for your derivatives from Problem 4
   (a) \( y'' = -\frac{10y^2 + 100x^2}{y^3} \)
   (b) \( y'' = \)
   (c) \( y'' = \)
   (d) \( y'' = \)

6. Maybe a little easier? Find \( y' \).
   (a) \( \sin y = x \). \( y' = \)
   (b) \( \cos y = x \). \( y' = \)
   (c) \( \tan y = x \). \( y' = \)
   (d) \( \sec y = x \). \( y' = \)
   (e) \( \csc y = x \). \( y' = \)
   (f) \( \cot y = x \). \( y' = \)

7. Find the derivatives.
   (a) \( y = x \tan^{-1} x \). \( y' = \)
   (b) \( y = 5\sin^{-1} 2x - 13\cos^{-1} x^2 \). \( y' = \)
   (c) \( y = \tan^{-1} x \sin^{-1} x \). \( y' = \)