

**Assignment 3**  
**due: October 31**

1. Suppose  $f(x)$  is a twice differentiable function. Find  $f''(1)$ , if  $f(x) + x^2(f(x))^3 = 10$ ,  $f(1) = 2$ , and  $f'(1) = 0$ . Show your work.
2. Find derivatives of the following functions. Show your work.
  - (a)  $y = \arctan(\sqrt{\sin x})$
  - (b)  $y = x \cdot \arccos x - \sqrt{1 - x^2}$
  - (c)  $y = \arcsin\left(\frac{x}{a}\right)$ , where  $a > 0$  is a constant
  - (d)  $y = \log_a x$ , where  $a > 0$ ,  $a \neq 1$ .
3. Find the equation of the tangent line to the curve  $x^4 + \cos y = e^x \sin y$  at the point  $(0, \frac{\pi}{4})$ . Show your work.
4. Find  $f''(0)$ , if  $f(x) = e^{\cos x} g(x)$ , where  $g(x)$  is a twice differentiable function satisfying  $g(0) = 2$ ,  $g'(0) = 1$ , and  $g''(0) = 3$ . Show your work.
5. Find all points at which the curve  $x^4 + y^4 = 16$  has a vertical tangent. Show your work.