

Show all work clearly and in order, and circle your final answers.  
Justify your answers algebraically whenever possible.

**1.** (2 points) True or false?

(a) If  $f$  is a differentiable function then  $\frac{d}{dx} [f(g(x))] = f'(g(x))g'(x)$  for all functions  $g(x)$ .

(b) If I differentiate both sides of the equation  $x^2 + y^2 = 5$  implicitly with respect to  $y$  (i.e. take  $\frac{d}{dy}$  of both sides), then the following equation results:  
 $2x\frac{dx}{dy} + 2y = 0$ .

**2.** (2 points) Differentiate:  $f(x) = \sqrt{\sin(x^3)}$ .

**3.** (2 points) Differentiate implicitly (with respect to  $x$ ):

$$(x^2 + y^2 - 1)^3 = x^2y^3.$$

Note: Interesting observation! The graph of the function in Problem 3 looks like this: