

# V1

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Last Name: \_\_\_\_\_

First Name: \_\_\_\_\_

ID: \_\_\_\_\_ Section: \_\_\_\_\_

Math 150A Midterm #2. March 18, 2005

**Attention!** Please, note that this is the closed book test. You are not allowed to use graphing calculator. Simple calculators are allowed. Please, show all important steps in you solution but do not make your solution excessively long.

1. Evaluate the indicated derivatives

a) (5pt) Find  $f'(x)$  if

$$f(x) = \arcsin(x) + \sin(2)$$

b) (5pt) Find  $g''(x)$  if

$$g(x) = x^5 + 3x^2 - x + 1$$

c) (5pt) find  $h'''(x)$  if

$$h(x) = \ln x$$

2. Find the derivative of  $f(x) = 1/x^2$  using the definition of the derivative. (You are not supposed to use the power rule in this problem!)

a) (5pt) Write the definition of  $f'(x)$ .

b) (3pt) Apply the definition of derivative to the function  $f(x) = 1/x^2$ .

c) (12pt) Find  $f'(x)$  by evaluating b).

3. Use chain rule to evaluate the following derivatives

a) (5pt) Find  $f'(x)$  if

$$f(x) = (x^3 + 1)^{10}$$

b) (5pt) find  $g'(x)$  if

$$g(x) = \sqrt{1 + \cos(x)}$$

c) (5pt) find  $h'(x)$  if

$$h(x) = \tan(\sin \sqrt{x})$$

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4. Using implicit differentiation, find the equation of the tangent line to the curve given by the equation

$$x^3 + xy - y = y^2 + 2$$

at point  $(2, 3)$ .

5. A worker is lowering a bucket of acrylic paint from an 80 feet tower. At which speed the paint hits the ground if at the moment when paint touches the surface the worker is 60 feet from the tower and is approaching the tower with the speed 1 foot per second. (see the picture)

6. a) (5pt) Write the differential of the function

$$f(x) = \tan(x)$$

b) (5pt) Use part a) to evaluate the absolute error for  $f(x)$  at  $x = 0$  for  $dx = 0.01$

c) (5pt) Use part b) to evaluate the relative error for  $f(x)$  at  $x = 0$  for  $dx = 0.01$