

NAME: \_\_\_\_\_

# MATH 181 TEST 2 SAMPLE

PLEASE SHOW ALL WORK!

1.) (10 pts). Find the equation of a line, in slope intercept form, that is tangent to the graph  $f(x) = 1 - \sqrt{x}$  at the point  $(1, 0)$  by the **limit process**. 1. \_\_\_\_\_

2.) Determine the x-value(s) at which the graph  $y = \frac{1}{x^2} - \frac{x}{4}$  has a horizontal tangent line. 2. \_\_\_\_\_

3.) (10 pts) Find the **slope** of the graph  $y = \frac{1}{\sqrt[3]{x^2}} + \frac{2x}{3} - \pi$  at  $x = 1$ . 3. \_\_\_\_\_

4.) Find the derivative of  $f(\theta) = 4.3 \cot \theta - \sin \theta$  4. \_\_\_\_\_

5.) Find the derivative of  $g(x) = \frac{\tan x \cot x - \sin^2 x}{1 + \sin x}$   
by **first** simplifying using a trigonometric identity.

5. \_\_\_\_\_

6.) (10 pts) If  $f(x) = 64x^{\frac{9}{4}} - \frac{x^4}{12} - 3x$ , find  $f''(16)$ .

6. \_\_\_\_\_

7.) Find the derivative of  $f(x) = 4x^2 \sec(x)$  using the product rule.

7. \_\_\_\_\_

8.) Find the derivative of  $f(x) = \left(\frac{1}{x} - 2x\right)(2x^2 + 1)$  using the product rule. Write answer as a single fraction.

8. \_\_\_\_\_

9.) Find the derivative of  $f(x) = \frac{x^2 - 9}{x - 2}$  using the quotient rule.

9. \_\_\_\_\_

10.) Find the derivative of  $f(\theta) = (3 - 4 \sin(5\theta))^5$  using the chain rule.

10. \_\_\_\_\_

11.) Find the derivative of  $y = 2x^2(3x + 5)^3$  using any method. Factor your answer.

11. \_\_\_\_\_

12.) Find the derivative of  $f(x) = \frac{\sin(2x)}{x}$  using any method. Write your answer as a single fraction.

12. \_\_\_\_\_

13.) Find the derivative of  $f(x) = 2\sqrt{\frac{x+x^2}{x}}$  by any method. 13. \_\_\_\_\_

14.) (10 points). Use  $x^3y^2 + 4y = 6x$  for the following questions:

a.) Find  $\frac{dy}{dx}$  by implicit differentiation. 14a. \_\_\_\_\_

b.) Use your answer in part a to find the **equation** of the tangent line at the point (2, 1) on the curve. 14b. \_\_\_\_\_

15.) (10 points) A road perpendicular to a highway leads to a farmhouse located 0.3 miles away (see figure). An automobile travels past the farmhouse at a speed of 60mph. How fast is the distance between the automobile and the farmhouse increasing when the automobile is 0.4 miles past the intersection of the highway and the road? 15. \_\_\_\_\_

