

AP Worksheet #4  
End of Chapter 2

All work must be shown and done on another sheet of paper!  
This is just your answer sheet!

Grading:

|                    |                    |
|--------------------|--------------------|
| 100% = 19 correct  | 78% = 14 correct   |
| 95% = 18 correct   | 75% = 13 correct   |
| 90% = 17.5 correct | 70% = 12 correct   |
| 88% = 17 correct   | 68% = 11 correct   |
| 85% = 16 correct   | 65% = 10.5 correct |
| 80% = 15 correct   | 60% = 10 correct   |

Work must support your answers.  
No exceptions.

Due Date: Friday, October 24<sup>th</sup>

Score: \_\_\_\_\_

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

**Do not use calculator (even for basic math) unless \*\* is by the problem.**

**Problems marked with @ are problems that will not be able to be done until the end of chapter 2.**

1. If  $f(x) = x^{\frac{3}{2}}$ , then  $f'(4) =$  1. \_\_\_\_\_
2. @If  $x^3 + 3xy + 2y^3 = 17$ , then in terms of  $x$  and  $y$ ,  $\frac{dy}{dx} =$  2. \_\_\_\_\_
3. If the function  $f$  is continuous for all real numbers and if  $f(x) = \frac{x^2 - 4}{x + 2}$  when  $x \neq -2$ , the  $f(-2) =$  3. \_\_\_\_\_
4. An equation of the line (in standard form) tangent to the graph of  $y = \frac{2x + 3}{3x - 2}$  at the point  $(1, 5)$  is 4. \_\_\_\_\_
5. If  $y = \tan x - \cot x$ , then  $\frac{dy}{dx} =$  5. \_\_\_\_\_
6. If  $h$  is the function given by  $h(x) = f(g(x))$ , where  $f(x) = 3x^2 - 1$  and  $g(x) = |x|$ , then  $h(x) =$  6. \_\_\_\_\_
7. If  $f(x) = (x - 1)^2 \sin x$ , then  $f'(0) =$  7. \_\_\_\_\_
8. The fundamental period of  $2 \cos(3x)$  is 8. \_\_\_\_\_
9. The slope of the line normal (perpendicular) to the graph of  $y = 2 \sec x$  at  $x = \frac{\pi}{4}$  is 9. \_\_\_\_\_
10. @\*\*Boats A and B leave the same place at the same time. Boat A heads due North at 12 km/hr. Boat B heads due east at 18 km/hr. After 2.5 hours, how fast is the distance between the boats increasing? 10. \_\_\_\_\_
11. If  $f(x) = (x^2 - 2x - 1)^{\frac{2}{3}}$ , then  $f'(0) =$  11. \_\_\_\_\_

12. A particle moves along the y-axis so that at time  $t$ , where  $0 \leq t \leq \pi$ , its position is given by  $s(t) = -2 \cos t - \frac{t^2}{2} + 10$ . 12. \_\_\_\_\_

What is the velocity of the particle when its acceleration is zero?

13.  $\lim_{\theta \rightarrow 0} \frac{1 - \cos \theta}{2 \sin^2 \theta}$  is 13. \_\_\_\_\_

14. @\*\*The top of a 25-foot ladder is sliding down a vertical wall at a constant rate of 3 feet per minute. When the top of the ladder is 7 feet from the ground, what is the rate of change of the distance between the bottom of the ladder and the wall? 14. \_\_\_\_\_

15. @Consider the equation  $x^2 - 2xy + 4y^2 = 52$ . Find the equation of the tangent line(s) to the curve at the point  $x = 2$ . 15. \_\_\_\_\_

16. If  $f$  is a differentiable function, then  $f'(a)$  is given by which of the following? Justify. 16. \_\_\_\_\_

I.  $\lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$

II.  $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a}$

III.  $\lim_{x \rightarrow h} \frac{f(x+h) - f(x)}{h}$

17. @The radius of a circle is increasing at a nonzero rate, and at a certain instant, the rate of increase in the area of the circle is numerically equal to the rate of increase in the circumference. At this instant, the radius of the circle is 17. \_\_\_\_\_

18. If  $f(x) = \sqrt{1 + \sqrt{x}}$ , find  $f'(x)$ .

18. \_\_\_\_\_

19. If  $f(x) = \sin^2 x$ , find  $f'''(x)$ .

19. \_\_\_\_\_

20. If  $y = \left( \frac{x^3 - 2}{2x^5 - 1} \right)^4$ , find  $\frac{dy}{dx}$  at  $x = 1$ .

20. \_\_\_\_\_

I did not use my calculator (even for basic math) on these problems unless the problem was marked with a \*\*.

Signature: \_\_\_\_\_