

Name: _____ Date: _____ Period: _____

Unit 2 Review – Differentiation: Definition & Fundamental Properties

Reviews do NOT cover all material from the lessons but will hopefully remind you of key points. To be prepared, you should review all packets from Unit 2.

Find the average rate of change of each function on the given interval. Use appropriate units if necessary.

1. $w(x) = \ln x; \quad 1 \leq x \leq 7$

2. $s(t) = -t^2 - t + 4; \quad [1, 5]$

 t represents seconds s represents feet

3. Find the derivative of $y = 2x^2 + 3x - 1$ by using the definition of the derivative. $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

4. For the function $h(t)$, h is the temperature of the oven in Fahrenheit, and t is the time measured in minutes.a. Explain the meaning of the equation $h(15) = 420$.b. Explain the meaning of the equation $h'(43) = -11$.

Find the derivative of each function.

5. $f(x) = 4 - \frac{1}{2x^2}$

6. $g(x) = 3\sqrt{x} - \frac{6}{x^2} + 5\pi^3$

7. $h(x) = 4e^x - 2 \cos x$

8. $s(t) = t^2 \sin(t)$

9. $d(t) = 3\sqrt{t} \ln t$

10. $y = \frac{4}{x} - \sec x$

11. $h(x) = \frac{2-x}{x+2}$

Find the equation of the tangent line of the function at the given x -value.

12. $f(x) = -2x^3 + 3x$ at $x = -1$.

13. $f(x) = 4 \sin x - 2$ at $x = \pi$

14. Find the equation for the normal line of $y = \frac{1}{2}x^2 + \frac{3}{4}x - 4$ at $x = -3$

15. If $f(x) = 3 \sin x - 2e^x$ find $f'(0)$. No calculator!

A calculator is allowed on the following problems.

16. If $f(x) = x \sin(3x^2 - 2)$; find $f'(7)$.

17. If $f(x) = \csc(3x)$ at $x = 2$.

18. Use the table below to estimate the value of $d'(120)$. Indicate units of measures.

t seconds	2	13	60	180	500
$d(t)$ feet	10	81	412	808	2,105

19. Is the function differentiable at $x = 2$?

$$f(x) = \begin{cases} 3x - 3x^2 - 5, & x < 2 \\ 7 - 9x, & x \geq 2 \end{cases}$$

20. What values of a and b would make the function differentiable at $x = 4$?

$$f(x) = \begin{cases} a\sqrt{x} + bx^2 - 1, & x < 4 \\ \frac{16}{x} + bx, & x \geq 4 \end{cases}$$