Chapter 2.1-2.5 Quiz Review

(Limit Definition of Derivative , Derivative Rules, Product & Quotient Rule)

No Calculators (answers can be left unsimplified)

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

1. $w(x) = \ln x; \quad 1 \le x \le 7$	2. $s(t) = -t^2 - t + 4;\ [1,5]$ t represents seconds s represents feet

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

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

Find the derivative of each function.

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!

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

Explain the meaning of d'(120) within context of this table.

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

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

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

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

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

Each limit represents the instantaneous rate of change of a function. Identify the original function, and the x-value of the instantaneous rate of change.

19. $\lim_{x \to 4} \frac{(x^2-3x)-(4)}{x-4}$

Function: $f(x) =$

Instantaneous rate at $x =$

20. $\lim_{h \to 0} \frac{9(5+h)-10(5+h)^2+(205)}{h}$

Function: $f(x) =$

Instantaneous rate at $x =$

Use the table to find the value of the derivatives of each function.

21.

x	$h(x)$	$h'(x)$	$r(x)$	$r'(x)$
-2	-3	2	-2	4

a. $f(x) = -h(x)r(x)$
Find $f'(-2)$.

b. $g(x) = \frac{h(x)+r(x)}{r(x)}$
Find $g'(-2)$.

c. $w(x) = (4 - 2h(x))(1 - r(x))$
Find $w'(-2)$.

22. At what x-value(s) does the function $f(x) = \frac{x^4}{4} - 3x^3 + 9x^2 + 7$ have a horizontal tangent?

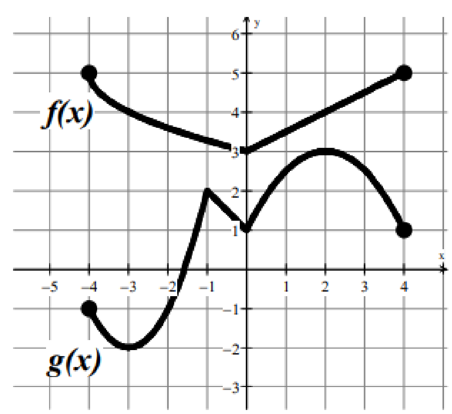
23. If $f(x) = \cos x + \sin x$, find $f'\left(\frac{\pi}{3}\right)$

24. $S(x)$ is the number of students in Mr. Kelly's class and x is the number of years since 2015.

a. Explain the meaning of $S(3) = 127$.

b. Explain the meaning of $S'(3) = 4$.

25. **Use the graphs of f and g to find the following.**



a. $h(x) = f(g(x))$. Find the average rate of change on the interval [2,4].

b. $j(x) = g(f(x))$. Find the average rate of change on the interval [−3,2].