

# Pre-Calculus – Unit 15

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

## 15 Corrective Assignment – Intro to Calculus

Pre-Calculus

Evaluate each limit.

1.  

$$\lim_{x \rightarrow -4} (2x^2 + 3x - 2)$$

2.  

$$\lim_{x \rightarrow -5} (2x - x^2)$$

3.  

$$\lim_{x \rightarrow 1} \sqrt{7x + 42}$$

4.  

$$\lim_{x \rightarrow 13} 2$$

5.  

$$\lim_{x \rightarrow 2} \frac{\sqrt{x+9} + \sqrt{11}}{x}$$

6.  

$$\lim_{x \rightarrow \frac{\pi}{3}} \cos x$$

7.  

$$\lim_{x \rightarrow \frac{\pi}{12}} \sin(2x)$$

8.  

$$\lim_{x \rightarrow 0} \frac{3x^2 + 7x}{x}$$

9.  

$$\lim_{x \rightarrow 10} \frac{x^2 - 5x - 50}{x - 10}$$

10.  

$$\lim_{x \rightarrow -2} \frac{3x^3 + x^2 - 10x}{x^2 + 2x}$$

11.  

$$\lim_{x \rightarrow 6} \frac{x^2 - 36}{6 - x}$$

12.  

$$\lim_{x \rightarrow 0} \frac{\sqrt{x+19} - \sqrt{19}}{x}$$

13.  

$$\lim_{x \rightarrow 0} \frac{\frac{1}{x+1} - 1}{x}$$

Find the derivative **using limits**. (SHOW WORK!)

14.  $f(x) = 5 - 8x$

15.  $y = 6x^2 - 4x + 1$

16.  $f(x) = \frac{1}{4-3x}$

For each problem, create an equation of the tangent line of  $f$  at the given point. Answer can be in point-slope form OR slope-intercept.

17.  $f(-4) = -1$  and  $f'(-4) = -3$

18.  $f(6) = 2$  and  $f'(6) = 5$

19. If  $f(x) = 5 \cos x$  and its derivative is  $f'(x) = -5 \sin x$ , find an equation of the tangent line at  $x = \frac{3\pi}{2}$ .

Find the derivative of each expression and simplify. Answers must contain positive exponents.

20.  $y = \pi^2$

21.  $y = -9x$

22.  $f(x) = 4$

23.  $f(x) = \frac{x}{5}$

24.  $s(t) = t^2 - 8t + 10$

25.  $y = \frac{5}{x}$

26.  $f(x) = \frac{3}{x^4}$

27.  $s(t) = 9\sqrt{t}$

28.  $y = \frac{6}{\sqrt{x}}$

29.  $w(x) = \sqrt[3]{x}$

30.  $f(x) = 11x^5 - 3x + 13$

31.  $f(x) = e^6 + \pi^5 - 2$

32.  $y = (x^2 + 6x - 2)(2x^{-2} + x^{-4})$

33.  $f(x) = \frac{x^3 - 5x^2 + 7x}{x}$

Find the value of the derivative of the function at the indicated point.

34.  $f(x) = \frac{1}{x^2}$  at  $(1,1)$

35.  $f(x) = \frac{1}{3\sqrt{x}}$  at  $(4, \frac{1}{6})$

Determine the  $x$ -value(s) at which the function has a horizontal tangent line.

36.  $y = x^4 - 8x^2 + 2$

37.  $y = x^3 + x$

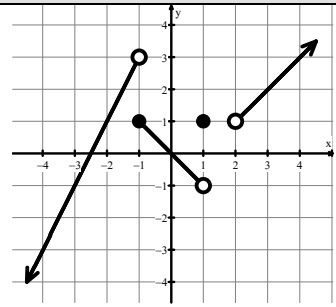
Find the equation of a tangent line of each function at the indicated point.

38.  $f(x) = \frac{16}{x} - \frac{x}{2}$ ;  $x = 4$

39.  $f(x) = 2x^3 - 5x$ ;  $x = -2$

**Skillz Review:** Using the graph, find each value.

a. $\lim_{x \rightarrow -1^-} f(x) =$	b. $f(1) =$	c. $\lim_{x \rightarrow 0} f(x) =$	d. $\lim_{x \rightarrow 2^+} f(x) =$
e. $f(-1) =$		f. $\lim_{x \rightarrow 1^-} f(x) =$	



**Application/Extension from Unit 15**

1. Using the following piecewise functions, find the given values.

$$g(x) = \begin{cases} x + 5, & x \leq -2 \\ |1 - x|, & -2 < x < 6 \\ \sqrt{x + 3}, & x \geq 6 \end{cases}$$

$\lim_{x \rightarrow 6^-} g(x) =$

$\lim_{x \rightarrow 6^+} g(x) =$

$\lim_{x \rightarrow -2^+} g(x) =$

$\lim_{x \rightarrow 6} g(x) =$

$g(6) =$

$\lim_{x \rightarrow -2} g(x) =$

$\lim_{x \rightarrow -2^-} g(x) =$

$g(-2) =$

2.  $B$  is the amount you owe on your cell phone bill and  $t$  is the number of texts you sent during the month for the function  $B(t)$ . Identify the meaning of the two equations. Write in full sentences!  
 $B(321) = 45$  and  $f'(321) = 0.2$

3.  $G$  is the amount of gas in the tank (in gallons) of your parents car during a family vacation and  $m$  is the number of miles traveled for the function  $G(m)$ .  
 $G(112) = 24.2$  and  $s'(112) = -0.04$

4. Mr. Kelly and Mr. Sullivan are having a throwing contest to see who can throw a baseball the farthest. Mr. Kelly realizes that if he pays for a flight to the moon, he can throw a baseball further than on earth. Use the information below to compare Mr. Kelly and Mr. Sullivan's throws and fill in the chart. [ $h$  is measured in feet and  $t$  is measured in seconds.]

	Mr. Sullivan throwing on Earth	Mr. Kelly throwing on the Moon.
Height of the baseball	$h(t) = -16t^2 + 25t + 6$	$h(t) = -\frac{27}{10}t^2 + 22t + 6$
Find an expression for velocity.		
Find an expression for acceleration.		
Find the time when the baseball is at its highest point. (The velocity would be zero.)		
How high is the baseball at its highest point?		

**For 5-7, use the graph of  $f$  to identify each of the values.**

5.  $f(3)$

6.  $f(1)$

7.  $\frac{f(3)-f(1)}{3-1}$

**For 8-10, insert the proper inequality symbol ( $<$  or  $>$ ) between the given quantities.**

8.

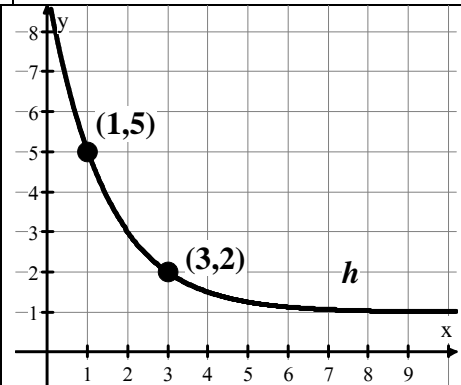
$\frac{f(3)-f(1)}{3-1} \square \frac{f(3)-f(2)}{3-2}$

9.

$f'(3) \square \frac{f(3)-f(1)}{3-1}$

10.

$f'(1) \square f'(7)$



### Answers to Unit 15 Corrective Assignment

1. 18	2. -35	3. 7	4. 2	5. $\sqrt{11}$	6. $\frac{1}{2}$	7. $\frac{1}{2}$	8. 7
9. 15	10. -11	11. -12	12. $\frac{1}{2\sqrt{19}}$	13. -1	14. -8	15. $12x - 4$	16. $-\frac{3}{(4-3x)^2}$
17. $y + 1 = -3(x + 4)$ or $y = -3x - 13$		18. $y - 2 = 6(x - 6)$ or $y = 6x - 34$		19. $y - 0 = 6\left(x - \frac{3\pi}{2}\right)$ or $y = 6x - 9\pi$		20. 0	21. -9
22. 0	23. $\frac{1}{5}$	24. $2t - 8$	25. $-\frac{5}{x^2}$	26. $-\frac{12}{x^5}$	27. $\frac{9}{2\sqrt{t}}$	28. $-\frac{3}{t^{\frac{3}{2}}}$	29. $\frac{1}{x^{\frac{2}{3}}}$
30. $55x^4 - 3x$	31. 0	32. $-\frac{12}{x^2} + \frac{6}{x^3} - \frac{18}{x^4} + \frac{8}{x^5}$		33. $2x - 5$	34. $f'(1) = -2$	35. $f'(4) = -\frac{1}{48}$	
36. $x = 0, 2, -2$		37. The function will never have a horizontal tangent.		38. $y - 2 = -\frac{3}{2}(x - 4)$ or $y = -\frac{3}{2}x + 8$		39. $y - 2 = -29(x + 2)$ or $y = -29x - 56$	

#### **Skillz Review:**

a. 1	b. 1	c. 0	d. 1	e. 1	f. -1
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#### **Application:**

<p>1. <math>\lim_{x \rightarrow 6^-} g(x) = 5</math></p> <p><math>\lim_{x \rightarrow -2^+} g(x) = 3</math></p> <p><math>g(6) = 9</math></p> <p><math>\lim_{x \rightarrow -2^-} g(x) = 3</math></p>	<p><math>\lim_{x \rightarrow 6^+} g(x) = 3</math></p> <p><math>\lim_{x \rightarrow 6} g(x) = \text{DNE}</math></p> <p><math>\lim_{x \rightarrow -2} g(x) = 3</math></p> <p><math>g(-2) = 3</math></p>	<p>2. If you sent 321 text messages, then you owe \$321 and the amount you owe is increasing by \$0.20 per text.</p> <p>3. If you have traveled 112 miles then there is 24.2 gallons of gas left in the tank and the amount of gas is decreasing at a rate of 0.04 gallons per mile.</p>
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4.	Sullivan on Earth	Kelly on the Moon.
Find an expression for velocity.	$v(t) = -32t + 25$	$v(t) = -\frac{27}{5}t + 22$
Find an expression for acceleration.	$a(t) = -32$	$a(t) = -\frac{27}{5}$
Find the time when the baseball is at its highest point. (The velocity would be zero.)	$t = \frac{25}{32} \approx 0.781$ seconds	$t = \frac{110}{27} \approx 4.074$ seconds
How high is the baseball at its highest point?	$h(0.781) \approx 15.766$ feet	$h(4.074) \approx 50.815$ feet