

Unit 2 Worksheet 3

Calculus 1

Evaluate the following limits.

1. $\lim_{x \rightarrow 8} 7 =$
 $\lim_{x \rightarrow 8} 7 = 7$

2. $\lim_{x \rightarrow 0} \pi =$
 $\lim_{x \rightarrow 0} \pi = \pi$

3. $\lim_{x \rightarrow 3} (7x - 4) =$
 $\lim_{x \rightarrow 3} (7x - 4) = 7(3) - 4$
 $\lim_{x \rightarrow 3} (7x - 4) = 21 - 4$
 $\lim_{x \rightarrow 3} (7x - 4) = 17$

4. $\lim_{x \rightarrow -1} (2x^3 - 5x) =$
 $\lim_{x \rightarrow -1} (2x^3 - 5x) = 2(-1)^3 - 5(-1)$
 $\lim_{x \rightarrow -1} (2x^3 - 5x) = 2(-1) + 5$
 $\lim_{x \rightarrow -1} (2x^3 - 5x) = -2 + 5$
 $\lim_{x \rightarrow -1} (2x^3 - 5x) = 3$

5. $\lim_{x \rightarrow 5} \sqrt{x^3 - 3x - 10} =$
 $\lim_{x \rightarrow 5} \sqrt{x^3 - 3x - 10} = \sqrt{5^3 - 3(5) - 10}$
 $\lim_{x \rightarrow 5} \sqrt{x^3 - 3x - 10} = \sqrt{125 - 15 - 10}$
 $\lim_{x \rightarrow 5} \sqrt{x^3 - 3x - 10} = \sqrt{100}$
 $\lim_{x \rightarrow 5} \sqrt{x^3 - 3x - 10} = 10$

$$\begin{aligned}
6. \quad & \lim_{x \rightarrow -3} \sqrt{5x^2 + 3x} = \\
& \lim_{x \rightarrow -3} \sqrt{5x^2 + 3x} = \sqrt{5(-3)^2 + 3(-3)} \\
& \lim_{x \rightarrow -3} \sqrt{5x^2 + 3x} = \sqrt{5(9) + (-9)} \\
& \lim_{x \rightarrow -3} \sqrt{5x^2 + 3x} = \sqrt{45 + (-9)} \\
& \lim_{x \rightarrow -3} \sqrt{5x^2 + 3x} = \sqrt{36} \\
& \lim_{x \rightarrow -3} \sqrt{5x^2 + 3x} = 6
\end{aligned}$$

$$\begin{aligned}
7. \quad & \lim_{x \rightarrow 3} \frac{x^2 - 2x}{x + 1} = \\
& \lim_{x \rightarrow 3} \frac{x^2 - 2x}{x + 1} = \frac{3^2 - 2(3)}{3 + 1} \\
& \lim_{x \rightarrow 3} \frac{x^2 - 2x}{x + 1} = \frac{9 - 6}{4} \\
& \lim_{x \rightarrow 3} \frac{x^2 - 2x}{x + 1} = \frac{3}{4}
\end{aligned}$$

$$\begin{aligned}
8. \quad & \lim_{x \rightarrow 0} \frac{6x - 9}{x^3 - 12x + 3} = \\
& \lim_{x \rightarrow 0} \frac{6x - 9}{x^3 - 12x + 3} = \frac{6(0) - 9}{0^3 - 12(0) + 3} \\
& \lim_{x \rightarrow 0} \frac{6x - 9}{x^3 - 12x + 3} = \frac{-9}{3} \\
& \lim_{x \rightarrow 0} \frac{6x - 9}{x^3 - 12x + 3} = -3
\end{aligned}$$

$$9. \quad \lim_{x \rightarrow 4} \frac{x^2 + 2x - 24}{x - 4} =$$

$$\lim_{x \rightarrow 4} \frac{x^2 + 2x - 24}{x - 4} = \frac{(x + 6)(x - 4)}{x - 4}$$

$$\lim_{x \rightarrow 4} \frac{x^2 + 2x - 24}{x - 4} = x + 6$$

$$\lim_{x \rightarrow 4} \frac{x^2 + 2x - 24}{x - 4} = 4 + 6$$

$$\lim_{x \rightarrow 4} \frac{x^2 + 2x - 24}{x - 4} = 10$$

$$10. \quad \lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x + 2} =$$

$$\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x + 2} = \frac{(x + 5)(x + 2)}{x + 2}$$

$$\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x + 2} = x + 5$$

$$\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x + 2} = -2 + 5$$

$$\lim_{x \rightarrow -2} \frac{x^2 + 7x + 10}{x + 2} = 3$$

$$11. \quad \lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} =$$

$$\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} = \frac{(x + 4)(x - 4)}{x - 4}$$

$$\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} = x + 4$$

$$\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} = 4 + 4$$

$$\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4} = 8$$

$$12. \quad \lim_{x \rightarrow -1} \frac{x^2 + 7x + 6}{x^2 - 4x - 5} =$$

$$\lim_{x \rightarrow -1} \frac{x^2 + 7x + 6}{x^2 - 4x - 5} = \frac{(x+6)(x+1)}{(x-5)(x+1)}$$

$$\lim_{x \rightarrow -1} \frac{x^2 + 7x + 6}{x^2 - 4x - 5} = \frac{x+6}{x-5}$$

$$\lim_{x \rightarrow -1} \frac{x^2 + 7x + 6}{x^2 - 4x - 5} = \frac{-1+6}{-1-5}$$

$$\lim_{x \rightarrow -1} \frac{x^2 + 7x + 6}{x^2 - 4x - 5} = \frac{5}{-6} \text{ or } -\frac{5}{6}$$

$$13. \quad \lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 - 4} =$$

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

$$\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 - 4} = \frac{x}{x+2}$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 - 4} = \frac{2}{2+2}$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 - 4} = \frac{2}{4}$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 2x}{x^2 - 4} = \frac{1}{2}$$

$$14. \quad \lim_{t \rightarrow 3} \frac{9-t^2}{3-t} =$$

$$\lim_{t \rightarrow 3} \frac{9-t^2}{3-t} = \frac{(3+t)(3-t)}{3-t}$$

$$\lim_{t \rightarrow 3} \frac{9-t^2}{3-t} = 3+t$$

$$\lim_{t \rightarrow 3} \frac{9-t^2}{3-t} = 3+3$$

$$\lim_{t \rightarrow 3} \frac{9-t^2}{3-t} = 6$$

$$15. \quad \lim_{t \rightarrow 4} \frac{4-t^2}{2-t} =$$

$$\lim_{t \rightarrow 4} \frac{4-t^2}{2-t} = \frac{4-4^2}{2-4}$$

$$\lim_{t \rightarrow 4} \frac{4-t^2}{2-t} = \frac{4-16}{-2}$$

$$\lim_{t \rightarrow 4} \frac{4-t^2}{2-t} = \frac{-12}{-2}$$

$$\lim_{t \rightarrow 4} \frac{4-t^2}{2-t} = 6$$

$$16. \quad \lim_{x \rightarrow \frac{\pi}{2}} \sin x =$$

$$\lim_{x \rightarrow \frac{\pi}{2}} \sin x = \sin\left(\frac{\pi}{2}\right)$$

$$\lim_{x \rightarrow \frac{\pi}{2}} \sin x = 1$$

$$17. \quad \lim_{x \rightarrow \frac{\pi}{2}} \cos x =$$

$$\lim_{x \rightarrow \frac{\pi}{2}} \cos x = \cos\left(\frac{\pi}{2}\right)$$

$$\lim_{x \rightarrow \frac{\pi}{2}} \cos x = 0$$

$$18. \quad \lim_{x \rightarrow \frac{3\pi}{2}} \sin x =$$

$$\lim_{x \rightarrow \frac{3\pi}{2}} \sin x = \sin\left(\frac{3\pi}{2}\right)$$

$$\lim_{x \rightarrow \frac{3\pi}{2}} \sin x = -1$$

$$19. \quad \lim_{x \rightarrow 2\pi} \cos x =$$

$$\lim_{x \rightarrow 2\pi} \cos x = \cos(2\pi)$$

$$\lim_{x \rightarrow 2\pi} \cos x = 1$$

20.
$$\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6} =$$

$$\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6} = \frac{(x-2)(x-2)}{(x+3)(x-2)}$$
$$\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6} = \frac{x-2}{x+3}$$
$$\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6} = \frac{2-2}{2+3}$$
$$\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6} = \frac{0}{5}$$
$$\lim_{x \rightarrow 2} \frac{x^2 - 4x + 4}{x^2 + x - 6} = 0$$

21.
$$\lim_{x \rightarrow 1} \frac{1-x}{x^2-1} =$$

$$\lim_{x \rightarrow 1} \frac{1-x}{x^2-1} = \frac{1-x}{(x+1)(x-1)}$$
$$\lim_{x \rightarrow 1} \frac{1-x}{x^2-1} = \frac{-(x-1)}{(x+1)(x-1)}$$
$$\lim_{x \rightarrow 1} \frac{1-x}{x^2-1} = \frac{-1}{x+1}$$
$$\lim_{x \rightarrow 1} \frac{1-x}{x^2-1} = \frac{-1}{1+1}$$
$$\lim_{x \rightarrow 1} \frac{1-x}{x^2-1} = \frac{-1}{2} \text{ or } -\frac{1}{2}$$

$$22. \quad \lim_{x \rightarrow 5} \frac{5-x}{x^2-25} =$$

$$\lim_{x \rightarrow 5} \frac{5-x}{x^2-25} = \frac{5-x}{(x+5)(x-5)}$$

$$\lim_{x \rightarrow 5} \frac{5-x}{x^2-25} = \frac{-(x-5)}{(x+5)(x-5)}$$

$$\lim_{x \rightarrow 5} \frac{5-x}{x^2-25} = \frac{-1}{x+5}$$

$$\lim_{x \rightarrow 5} \frac{5-x}{x^2-25} = \frac{-1}{5+5}$$

$$\lim_{x \rightarrow 5} \frac{5-x}{x^2-25} = \frac{-1}{10} \text{ or } -\frac{1}{10}$$

$$23. \quad \lim_{x \rightarrow 0} \frac{x}{x} =$$

$$\lim_{x \rightarrow 0} \frac{x}{x} = \frac{1}{1}$$

$$\lim_{x \rightarrow 0} \frac{x}{x} = 1$$

$$24. \quad \lim_{x \rightarrow 3} \frac{x-3}{6-2x} =$$

$$\lim_{x \rightarrow 3} \frac{x-3}{6-2x} = \frac{x-3}{2(3-x)}$$

$$\lim_{x \rightarrow 3} \frac{x-3}{6-2x} = \frac{x-3}{-2(x-3)}$$

$$\lim_{x \rightarrow 3} \frac{x-3}{6-2x} = \frac{1}{-2} \text{ or } -\frac{1}{2}$$