



In problems 14-19, evaluate the limit (if it exists) and simplify. Use appropriate notation (lim when required and drop lim when required) and show your 'algebra' work for full credit! There is no need to use explanations of left and right limits except on #19b.

14.)  $\lim_{x \rightarrow 3} \left( \frac{9-x^2}{x-3} \right) = \underline{-6}$  Show work!   
 (Factor, cancel)  $\lim_{x \rightarrow 3} \frac{-(x^2-9)}{(x-3)} = \lim_{x \rightarrow 3} \frac{-(x+3)(x-3)}{(x-3)}$    
 (Factor out -1)  $= \lim_{x \rightarrow 3} -(x+3) = -(3+3) = -6$

15.)  $\lim_{x \rightarrow 10} \left( \frac{\sqrt{x+6}-1}{x-7} \right) = \underline{1}$  Show work!   
 $= \frac{\sqrt{10+6}-1}{10-7} = \frac{\sqrt{16}-1}{3} = \frac{4-1}{3} = \frac{3}{3} = 1$  } some work

16.)  $\lim_{x \rightarrow -5} \left( \frac{x+5}{x^2+2x-15} \right) = \underline{-\frac{1}{8}}$  Show work!   
 $= \lim_{x \rightarrow -5} \frac{(x+5)}{(x+5)(x-3)} = \lim_{x \rightarrow -5} \frac{1}{x-3} = \frac{1}{-5-3} = -\frac{1}{8}$    
 (Notation) (Factor, cancel) something

17.)  $\lim_{x \rightarrow 1} (9) = \underline{9}$

18.)  $\lim_{x \rightarrow -2} (x+2) = \underline{0}$  Show work!   
 $-2+2=0$    
 \* If their work shows = 0, but they put DNE in blank, they lose pt.

19.)  $\lim_{x \rightarrow 3} f(x)$ , where  $f(x) = \begin{cases} x^2-5 & x \leq 3 \\ 1-x & x > 3 \end{cases}$    
 $= \underline{\text{DNE}}$  Show your work for this answer below in 19b.

19b.) Show supporting work below for your answer to 19.) using the appropriate left and right limit notations.

$\lim_{x \rightarrow 3^-} (x^2-5) = 9-5 = 4$    
 $\neq \lim_{x \rightarrow 3^+} (1-x) = 1-3 = -2$    
 (Notation - left and right limit correct notation)



In problems 14-19, evaluate the limit (if it exists) and simplify. Use appropriate notation (lim when required and drop lim when required) and show your 'algebra' work for full credit! There is no need to use explanations of left and right limits except on #19b.

14.)  $\lim_{x \rightarrow 5} \left( \frac{25-x^2}{x-5} \right) = \underline{-10}$  ① Show work!

① Factor; cancel ① Factor out -1  
 $\lim_{x \rightarrow 5} \frac{(x^2-25)}{x-5} = \lim_{x \rightarrow 5} \frac{-(x+5)(x-5)}{(x-5)}$  4  
 $= \lim_{x \rightarrow 5} -(x+5) = -(5+5) = -10$

15.)  $\lim_{x \rightarrow 3} \left( \frac{\sqrt{x+6}-1}{x-7} \right) = \underline{\frac{2}{-4} \text{ or } -\frac{1}{2}}$  ① Show work! (Don't cancel off if not simplified.)

$= \frac{\sqrt{3+6}-1}{3-7} = \frac{\sqrt{9}-1}{3-7} = \frac{3-1}{-4} = \frac{2}{-4} = -\frac{1}{2}$  } some work ① 2

16.)  $\lim_{x \rightarrow 3} \left( \frac{x-3}{x^2+2x-15} \right) = \underline{\frac{1}{8}}$  ① Show work!

$= \lim_{x \rightarrow 3} \frac{(x-3)}{(x+5)(x-3)} = \lim_{x \rightarrow 3} \frac{1}{(x+5)} = \frac{1}{3+5} = \frac{1}{8}$  ← some work ① 4  
 ① Notation ① Factor; cancel

17.)  $\lim_{x \rightarrow 9} (1) = \underline{1}$  1

18.)  $\lim_{x \rightarrow -9} (x+9) = \underline{0}$  ① Show work!

$-9+9=0$  No work actually req'd. (Even if you know so!) \* If they put ONE they lose the point. ①

19.)  $\lim_{x \rightarrow 2} f(x)$ , where  $f(x) = \begin{cases} x^2-5 & x \leq 2 \\ 1-x & x > 2 \end{cases}$   
 $= \underline{\text{DNE}}$  ① Show your work for this answer below in 19b. 4

19b.) Show supporting work below for your answer to 19.) using the appropriate left and right limit notations.

$\lim_{x \rightarrow 2^-} (x^2-5) = 2^2-5 = -1$  ① Notation - left and right limit correct notation.  
 $\neq \lim_{x \rightarrow 2^+} (1-x) = 1-2 = -1$  ①



In problems 14-19, evaluate the limit (if it exists) and simplify. Use appropriate notation (lim when required and drop lim when required) and show your 'algebra' work for full credit! There is no need to use explanations of left and right limits except on #19b.

14.)  $\lim_{x \rightarrow 8} \left( \frac{x^2 - 64}{8 - x} \right) = -16$  ①

① notation ① Factor and cancel ① Factor out -1  
 $\lim_{x \rightarrow 8} \frac{(x+8)(x-8)}{-(x-8)} = \lim_{x \rightarrow 8} -(x+8) = -(8+8) = -16$  4

15.)  $\lim_{x \rightarrow 5} \left( \frac{\sqrt{x+20} - 1}{x-7} \right) = -2$  ①

① notation ① Factor and cancel ① Factor out -1  
 $= \frac{\sqrt{5+20} - 1}{5-7} = \frac{\sqrt{25} - 1}{5-7} = \frac{5-1}{5-7} = \frac{4}{-2} = -2$  } some work ① 2

16.)  $\lim_{x \rightarrow 3} \left( \frac{x-3}{x^2 + 2x - 15} \right) = \frac{1}{8}$  ①

① notation ① Factor and cancel  
 $= \lim_{x \rightarrow 3} \frac{(x-3)}{(x+5)(x-3)} = \lim_{x \rightarrow 3} \frac{1}{(x+5)} = \frac{1}{3+5} = \frac{1}{8}$  ← some work ① 4

17.)  $\lim_{x \rightarrow 3} (1) = 1$

18.)  $\lim_{x \rightarrow 1} (x-1) = 0$  ①

① notation ① Factor and cancel  
 $1-1=0$  NO work actually req'd  
 \* If their work shows 0, but they put DNE in black, they lose the point 1

19.)  $\lim_{x \rightarrow 1} f(x)$ , where  $f(x) = \begin{cases} x^2 - 4 & x \leq 1 \\ -2 - x & x > 1 \end{cases}$

=  $-3$  ① Show your work for this answer below in 19b. 4

19b.) Show supporting work below for your answer to 19.) using the appropriate left and right limit notations.

$\lim_{x \rightarrow 1^-} (x^2 - 4) = 1^2 - 4 = -3$  ①  
 $\lim_{x \rightarrow 1^+} (-2 - x) = -2 - 1 = -3$  ①  
 ① notation - left & right limit correct notation.



In problems 14-19, evaluate the limit (if it exists) and simplify. Use appropriate notation (lim when required and drop lim when required) and show your 'algebra' work for full credit! There is no need to use explanations of left and right limits except on #19b.

14.)  $\lim_{x \rightarrow 9} \left( \frac{x^2 - 81}{9 - x} \right) = \underline{-18}$  <sup>① Notation</sup> Show work! <sup>① Factor & cancel</sup>  $\lim_{x \rightarrow 9} \frac{(x+9)(x-9)}{-(x-9)} = \lim_{x \rightarrow 9} -(x+9) = -(9+9) = -18$  <sup>① Factor out -1</sup> 4

15.)  $\lim_{x \rightarrow 4} \left( \frac{\sqrt{x+12} - 1}{x - 7} \right) = \underline{-1}$  <sup>①</sup> Show work!   
 $= \frac{\sqrt{4+12} - 1}{4 - 7} = \frac{\sqrt{16} - 1}{4 - 7} = \frac{4 - 1}{4 - 7} = \frac{3}{-3} = -1$  } some work ① 2

16.)  $\lim_{x \rightarrow 3} \left( \frac{x - 3}{x^2 + 2x - 15} \right) = \underline{\frac{1}{8}}$  <sup>①</sup> Show work!   
 $\lim_{x \rightarrow 3} \frac{(x-3)}{(x-3)(x+5)} = \lim_{x \rightarrow 3} \frac{1}{x+5} = \frac{1}{3+5} = \frac{1}{8}$  <sup>① something</sup> 4   
 ① Notation ① Factor & cancel

17.)  $\lim_{x \rightarrow 1} (3) = \underline{3}$  1

18.)  $\lim_{x \rightarrow -3} (x + 3) = \underline{0}$  Show work!   
 $-3 + 3 = 0$  Don't have to show work but if they put 0 in a blank for x if you show zero, they use the point. 1

19.)  $\lim_{x \rightarrow 2} f(x)$ , where  $f(x) = \begin{cases} x^2 - 8 & x \leq 2 \\ -2 - x & x > 2 \end{cases}$    
 $= \underline{-4}$  <sup>①</sup> Show your work for this answer below in 19b. 4

19b.) Show supporting work below for your answer to 20.) using the appropriate left and right limit notations.

$\lim_{x \rightarrow 2^-} (x^2 - 8) = 2^2 - 8 = 4 - 8 = -4$  <sup>① Notation - left and right limit correct notation</sup>   
 $= \lim_{x \rightarrow 2^+} (-2 - x) = -2 - 2 = -4$  ①





In problems 14-19, evaluate the limit (if it exists) and simplify. Use appropriate notation (lim when required and drop lim when required) and show your 'algebra' work for full credit! There is no need to use explanations of left and right limits except on #19b.

14.)  $\lim_{x \rightarrow 6} \left( \frac{36 - x^2}{x - 6} \right) = \underline{-12}$  (1) Show work!

(1) Notation  
 $\lim_{x \rightarrow 6} \frac{-(x^2 - 36)}{(x - 6)} = \lim_{x \rightarrow 6} \frac{-(x+6)(x-6)}{(x-6)}$  (1) Factor; cancel  
 $= \lim_{x \rightarrow 6} -(x+6) = -12$  (1) Factor; put -1

15.)  $\lim_{x \rightarrow 10} \left( \frac{\sqrt{x+71} - 1}{x - 7} \right) = \underline{\frac{8}{3}}$  (1) Show work!

$= \frac{\sqrt{10+71} - 1}{10 - 7} = \frac{\sqrt{81} - 1}{10 - 7} = \frac{9 - 1}{10 - 7} = \frac{8}{3}$  } some work (1)

16.)  $\lim_{x \rightarrow 5} \left( \frac{x - 5}{x^2 - 2x - 15} \right) = \underline{\frac{1}{8}}$  (1) Show work!

$= \lim_{x \rightarrow 5} \frac{x - 5}{(x - 5)(x + 3)} = \lim_{x \rightarrow 5} \frac{1}{x + 3} = \frac{1}{5 + 3} = \frac{1}{8}$  ← something (1)

(1) Notation (1) Factor; cancel

17.)  $\lim_{x \rightarrow 1} (9000) = \underline{9000}$  (1)

18.)  $\lim_{x \rightarrow 2} (x^2 - 4) = \underline{0}$  (1) Show work! (\*lose the point if work shows = 0, but put DNE in ans no blank)

$2^2 - 4 = 0$  (NO work actually req'd.)

19.)  $\lim_{x \rightarrow 5} f(x)$ , where  $f(x) = \begin{cases} x^2 - 5 & x \leq 5 \\ 1 - x & x > 5 \end{cases}$

(1) = DNE Show your work for this answer below in 19b.

19b.) Show supporting work below for your answer to 19.) using the appropriate left and right limit notations.

$\lim_{x \rightarrow 5^-} (x^2 - 5) = 5^2 - 5 = 20$  (1)  
 $\neq \lim_{x \rightarrow 5^+} (1 - x) = 1 - 5 = -4$  (1)

(1) Notation - left and right limit correct notation