Pre-Calculus
Techniques for Finding Limits – Day 2

Name: Key
Date: Period:

Evaluate the limit by the appropriate technique.

1) $\lim_{x\to1^-}\frac{x-1}{x^2-1}$ $\frac{\cancel{x-1}}{(x+1)\cancel{(x-1)}}$ $=\boxed{\frac{1}{2}}$

2) $\lim_{x\to16^+}\frac{4-\sqrt{x}}{x-16}$ $\frac{\overset{-(\sqrt{x}-4)}{(4-\sqrt{x})}}{\cancel{(\sqrt{x}-4)}(\sqrt{x}+4)}$

$\lim_{x\to16^+}\frac{-1}{\sqrt{x}+4}=\boxed{-\frac{1}{8}}$

3) $\lim_{x\to0^-}\frac{\sqrt{x+2}-\sqrt{2}}{x}$

$\lim_{x\to0^-}\frac{\cancel{x}\,1}{\cancel{x}(\sqrt{x+2}+\sqrt{2})}$ $\boxed{\frac{1}{2\sqrt{2}}}$

4) $\lim_{x\to0^+}(x\ln x)$ use calc

$=0$

5) $\lim_{x\to3^+}(x+|2x-6|)$

$=(3+|6-6|)=3$

6) $\lim_{x\to0^-}\frac{2e^{\frac{1}{x}}}{e^{\frac{1}{x}}+1}$ on paper

7) $\lim_{x\to-2^+}f(x), f(x)=\begin{cases}-x^2-8x-16, & x<-2 \text{ left}\\ 2x, & x\ge-2 \text{ right}\end{cases}$

Right $f(-2)=2(-2)=-4$

8) $\lim_{x\to-3^+}f(x), f(x)=\begin{cases}x, & x<-3 \text{ left}\\ -\frac{x}{2}-\frac{9}{2}, & x\ge-3 \text{ right}\end{cases}$

Right $f(-3)=-\frac{(-3)}{2}-\frac{9}{2}=\frac{3-9}{2}$

$=-3$

Determine if the limits exists by evaluating the corresponding one-sided limits.

9) $\lim_{x\to2}\frac{|x-2|}{x-2}$

$\lim_{x\to2^-}f(x)=-1$

$\lim_{x\to2^+}f(x)=1$

DNE b/c $-1\ne1$

10) $\lim_{x\to1}\frac{1}{x^2+1}$

$\lim_{x\to1^+}f(x)=\frac{1}{2}$

$\lim_{x\to1^-}f(x)=\frac{1}{2}$

$=\frac{1}{2}$

11) $\lim_{x\to1}f(x), f(x)=\begin{cases}2x+1, & x<1 \text{ left}\\ 4-x^2, & x\ge1 \text{ right}\end{cases}$

left $f(1)=2(1)+1=3$

Right $f(1)=4-(1)^2=3$

$=3$

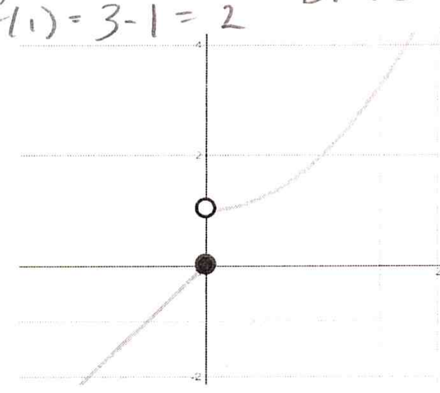
12) $\lim_{x\to1}f(x), f(x)=\begin{cases}4-x^2, & x\le1 \text{ left}\\ 3-x, & x>1 \text{ right}\end{cases}$

left $f(1)=4-1^2=3$

right $f(1)=3-1=2$

DNE b/c $3\ne2$

13) For the function $f(x)=\begin{cases}2x, & x\le0\\ x^2+1, & x>0\end{cases}$ shown the right, find each of the following limits. If the limit doesn't exist, explain why.

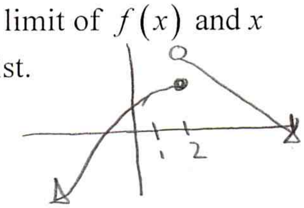


a) $\lim_{x\to0^-}f(x)=0$

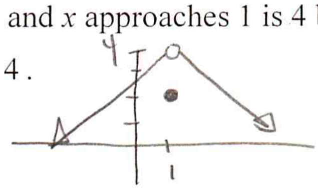
b) $\lim_{x\to0^+}f(x)=1$

c) $\lim_{x\to0}f(x)$ DNE b/c R & L behavior do not agree

14) Sketch the graph of a function for which $f(2)$ is defined but for which the limit of $f(x)$ and x approaches 2 does not exist.



15) Sketch the graph of a function for which the limit of $f(x)$ and x approaches 1 is 4 but for which $f(1)\ne4$.



6. $\lim_{x \to 0^-} \frac{2e^{\frac{1}{x}}}{e^{\frac{1}{x}}+1}$ $\frac{2e^{\frac{1}{0}}}{e^{\frac{1}{0}}+1}$ use calc.

$$\lim_{x \to 0^-} \frac{2e^{\frac{1}{x}}}{e^{\frac{1}{x}}+1} = 0$$