AP Calculus – Mixed Six – Limits with Technology

Calculator-Active

Topics 1.3 and 1.4 Estimating Limits from Tables and Graphs

1. Factual Recall

Consider the function $f(x)=\dfrac{x^2+0.6x-2.8}{x-1.4}$ and the limit as x approaches 1.4.

Explore the graph to determine the limit, then complete the table to support your limit approximation from the graph.

x	$f(x)$
1.38	
1.39	
1.41	
1.42	

2. Carry out a Procedure

Consider the piecewise function

$$f(x)=\begin{cases}-4x-8, & x<-2\\ (x+2)^2-0.2, & x\ge -2\end{cases}.$$

Explore the graph to determine the one-sided limits.

$\lim\limits_{x\to -2^-} f(x)=$

$\lim\limits_{x\to -2^+} f(x)=$

3. Classify a Mathematical Object

Explore the graph of each function to determine whether the limit is true or false.

T/F	Function	Limit
	$f(x)=\dfrac{\sin(3x)}{x}$	$\lim\limits_{x\to 0} f(x)=3$
	$g(x)=\dfrac{\ln(x^2)}{\ln x}$	$\lim\limits_{x\to \infty} g(x)=1$
	$h(x)=\dfrac{1-\cos^2(2x)}{x^2}$	$\lim\limits_{x\to 0} h(x)=4$
	$j(x)=\dfrac{\sin(x-5)}{2(x-5)}$	$\lim\limits_{x\to 0} j(x)=1$

4. Prove, Show, Justify

Which table of values would be the best to use to determine that $\lim\limits_{x\to 3} g(x)=11$? Give a reason for your answer.

Table 1

x	$g(x)$
2.5	11.211
2.9	11.208
2.99	11.201
3	4
3.01	11.202
3.1	11.207
3.5	11.212

Table 2

x	$g(x)$
2.5	4.211
2.9	4.208
2.99	4.201
3	11
3.01	4.202
3.1	4.207
3.5	4.212

5. Extend a Concept

Consider the function $f(x)=\dfrac{\cos\left(\frac{3}{x}\right)}{2+\frac{3}{x}}$. Use either a table or graph (or both), to determine the following limits.

$\lim\limits_{x\to -\infty} f(x)=$

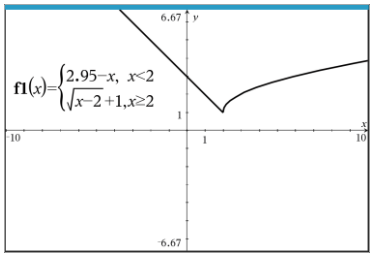
$\lim\limits_{x\to \infty} f(x)=$

$\lim\limits_{x\to 0} f(x)=$

6. Critique a Fallacy

Consider the graph of the piecewise function

$$f(x)=\begin{cases}2.95-x, & x<2\\ \sqrt{x-2}+1, & x\ge 2\end{cases}.$$



Cathy observes the graph and states that $\lim\limits_{x\to 2} f(x)=1$.

What is wrong with her statement? Write a correct statement.

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