10.3 More on Limits

Target 9C: Evaluate a limit of a function graphically
Target 9D: Calculate one-sided limits and two-sided limits

Review of Prior Concepts

Given $\lim_{x\to 3} f(x) = 2$ and $\lim_{x\to 3} g(x) = -1$, find:

a) $\lim_{x\to 3}(2f(x) + g(x))$

$= 2\underbrace{\lim_{x\to 3} f(x)}_{2} + \underbrace{\lim_{x\to 3} g(x)}_{-1}$

$= 2\cdot 2 + -1$

$= \boxed{3}$

b) $\lim_{x\to 3} \frac{(g(x))^2}{f(x)-4}$

$= \frac{\left[\lim_{x\to 3} g(x)\right]^2}{\underbrace{\lim_{x\to 3} f(x)}_{2} - \lim_{x\to 3} 4} = \frac{(-1)^2}{2-4} = \boxed{\frac{1}{-2}}$

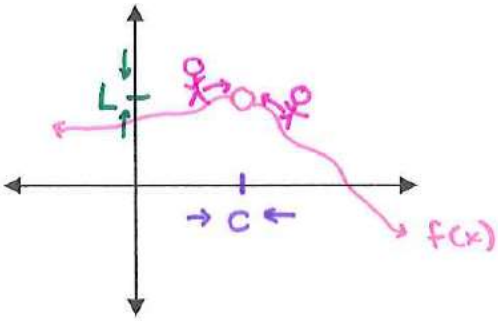
More Practice

Limits Analytically

http://www.ck12.org/book/CK-12-Precalculus-Concepts/section/14.4/
http://www.ck12.org/book/CK-12-Precalculus-Concepts/section/14.5/
http://precalculus.flippedmath.com/151-limits-analytically.html
http://www.barrington220.org/cms/lib8/IL01001296/Centricity/Domain/321/1.3%20D1%20Ans.pdf
https://youtu.be/-gjURkNuh9o
https://youtu.be/MspClN-r8C0

Finding Limits Graphically

$\lim_{x\to c} f(x) = L$



In order for $\lim_{x\to c} f(x)$ to exist,

$\lim_{x\to c^-} f(x)$ has to equal $\lim_{x\to c^+} f(x)$

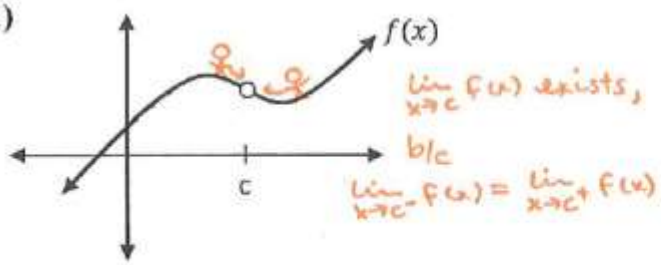
from left

from right

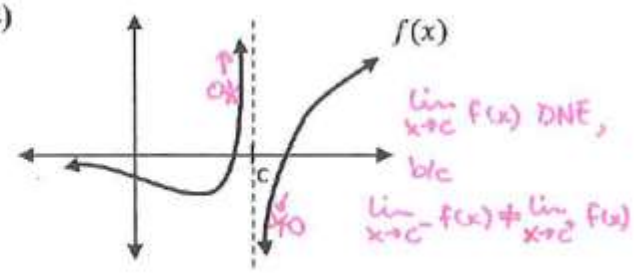
"limit from the left = limit from the right"

Examples: Does $\lim_{x\to c} f(x)$ exist? Explain why or why not.

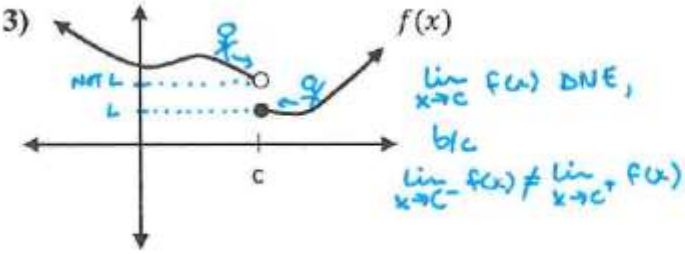
1)



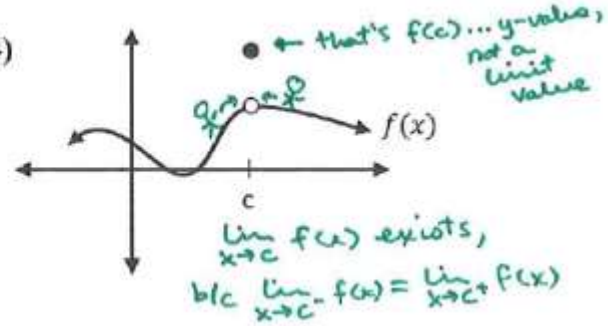
2)



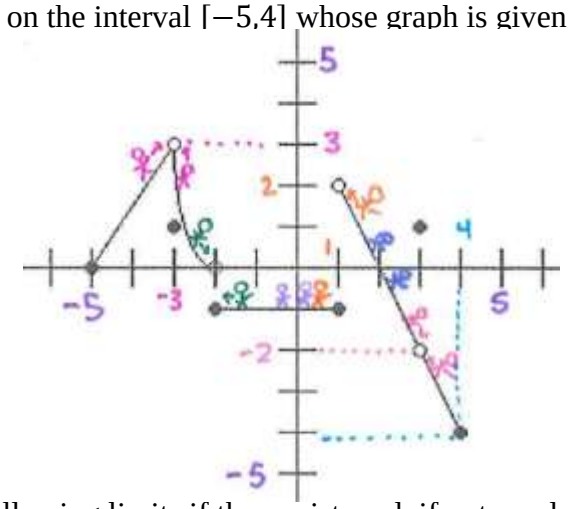
3)



4)



Let g be a function defined on the interval $[-5,4]$ whose graph is given as:



Using the graph, find the following limits if they exist, and, if not, explain why not.

1.) $\lim_{x\to 3} g(x)$ $= -2$

2.) $\lim_{x\to 0} g(x)$ $= -1$

3.) $\lim_{x\to -3} g(x)$ $= 3$

4.) $\lim_{x\to 1^+} g(x)$ $= 2$

5.) $\lim_{x\to 1^-} g(x)$ $= -1$

6.) $\lim_{x\to 1} g(x)$ $=$ DNE

b/c $\lim_{x\to 1^-} g(x) \neq \lim_{x\to 1^+} g(x)$

7.) $\lim_{x\to -2^-} g(x)$ $= 0$

8.) $\lim_{x\to 4} g(x)$ $=$ DNE

$\lim_{x\to 4^-} g(x) = -4$

$\lim_{x\to 4^+} g(x) =$ DNE

$\therefore, \lim_{x\to 4^-} g(x) \neq \lim_{x\to 4^+} g(x)$

9.) $\lim_{x\to 2} g(x)$ $= 0$

10.) $\lim_{x\to -2^+} g(x)$ $= -1$

More Practice

Limits Graphically

http://www.coolmath.com/precalculus-review-calculus-intro/precalculus-algebra/21-rational-functions-limits-infinity-right-left-01
https://www.khanacademy.org/math/ap-calculus-ab/limits-basics-ab/limits-from-graphs-ab/v/limits-from-graphs-undefined
http://precalculus.flippedmath.com/23-limits-graphically.html
http://philschatz.com/precalculus-book/contents/m49452.html
http://www.mathsisfun.com/calculus/limits.html
https://youtu.be/IklVRSonvFQ
https://youtu.be/UkjgJQaGx98
https://youtu.be/XOu_LFGai0A

Homework Assignment

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