Name:_____

Quiz Review

Find each limit algebraically:

1. $\lim_{x\to 0}\dfrac{\frac{1}{5+x}-\frac{1}{5}}{x}$

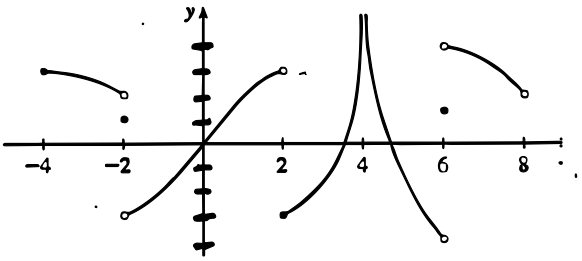
2. $\lim_{x\to 0}\dfrac{\sqrt{x+1}-1}{x}$

3. $\lim_{y\to 0}\dfrac{2(x+y)-2x}{y}$

4. $\lim_{x\to -3}\dfrac{x^2+x-6}{x+3}$

5. Use the graph of g below:

a) State the intervals on which g is continuous.



b) Find the limit:

$\lim_{x\to -2^+} g(x) =$ $\lim_{x\to -2^-} g(x) =$ $\lim_{x\to -2} g(x) =$ $\lim_{x\to 6^+} g(x) =$

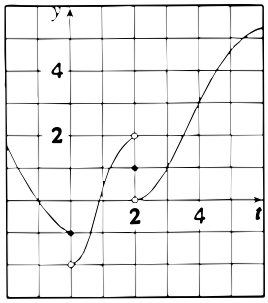
$\lim_{x\to 2^-} g(x) =$ $\lim_{x\to 4^+} g(x) =$ $\lim_{x\to 6^-} g(x) =$ $\lim_{x\to 0^+} g(x) =$

6. For the function g whose graph is given, state the value of the given quantity, if it exists. If it does not exist, explain why.

a) $\lim_{t\to 0^-} g(t)$ b) $\lim_{t\to 0^+} g(t)$ c) $\lim_{t\to 0} g(t)$

d) $\lim_{t\to 2^-} g(t)$ e) $\lim_{t\to 2^+} g(t)$ f) $\lim_{t\to 2} g(t)$

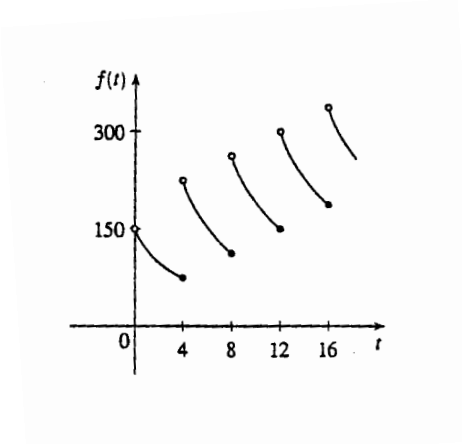
g) $g(2)$ h) $\lim_{t\to 4} g(t)$



7. A patient receives a 150-mg injection of a drug every 4 hours. The graph shows the amount $f(t)$ of the drug in the bloodstream after t hours. (Later we will be able to compute the dosage and time interval to ensure that the concentration of the drug does not reach a harmful level.)

Find $\lim_{t\to 12^-} f(t)$ and $\lim_{t\to 12^+} f(t)$

and explain the significance of these one-sided limits.



For #8-11: Draw the graph of f(x). Discuss the continuity of the graph, and find $\lim_{x\to a} f(x)$.

8. $f(x)=\begin{cases}2x & \text{if } x\le 1\\ 2 & \text{if } x>1\end{cases}$ $\quad a=1$

9. $f(x)=\begin{cases}\dfrac{x^2-x-12}{x+3} & \text{if x} \neq \text{-3}\\ \text{-5} & \text{if x=-3}\end{cases}$ $\quad a=-3$

10. $f(x)=\begin{cases}1+x^2 & \text{if x<1}\\ 4-x & \text{if x} \ge 1\end{cases}$ $\quad a=1$

11. $f(x)=\begin{cases}x+1 & \text{if } x<0\\ e^x & \text{if } 0\le x\le 1\\ 2-x & \text{if } x>1\end{cases}$ $\quad a=0$

12. For what value of the constant c is the function f continuous on $(-\infty,\infty)$?

$$f(x)=\begin{cases}cx+1 & \text{if } x\le 3\\ cx^2-1 & \text{if } x>3\end{cases}$$

13. Where is the function $f(x)=\dfrac{x^2-7x+12}{x^2-2x-8}$ discontinuous? What kind of discontinuities exist?

14. If the function f is continuous for all real numbers and if $f(x)=\dfrac{x^2-7x+12}{x-4}$ when $x\neq 4$, then $f(4)=$

A) 1 B) $\frac{8}{7}$ C) -1 D) 0 E) undefined

Find the value of the limit, if it exists

$$f(x)=\begin{cases}2x^2 & if\ x\le -1\\ 3+x & if\ x>-1\end{cases}$$

$$g(x)=\begin{cases}2x-2 & if\ x<0\\ x+1 & if\ x\ge 0\end{cases}$$

15. $\lim_{x\to -1^+} f(x)$

16. $\lim_{x\to -1^-} f(x)$

17. $\lim_{x\to -1} f(x)$

18. $\lim_{x\to 0^+} g(x)$

19. $\lim_{x\to 0^-} g(x)$

20. $\lim_{x\to 0} g(x)$