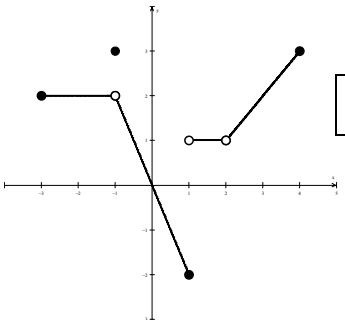
Calculus I Worksheet #8 Review for Test 2 – Limits and Continuity

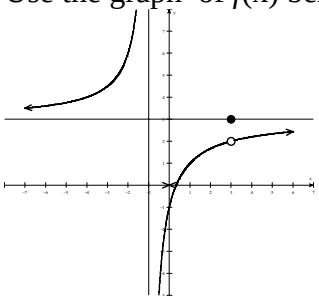
1	$\lim_{x\to 0}\left(\frac{\sin 5x}{\cos 4x}\right)$	2	$\lim_{x\to 0}\left(\frac{\sin^2 3x}{x^2\cos x}\right)$
3	$\lim_{x\to 0}\left(\frac{\sin 5x}{\sin\frac{1}{3}x}\right)$	4	$\lim_{x\to 0}\left(\frac{x}{\tan x}\right)$
5	$\lim_{x\to\frac{\pi}{2}}\frac{1+\sin x}{1-\cos x}$	6	$\lim_{x\to\infty}\frac{\cos 2x}{x^2}$
7	$\lim_{x\to\infty}\frac{6x^3-5x}{x^2+4x^3}$	8	$\lim_{x\to b}\left(\frac{4a^2-x^2}{2a+x}\right)$
9	$\lim_{x\to-\infty}\frac{8x^3-5x}{x^2-3x}$	10	$\lim_{x\to\infty}\frac{x^2+x^4}{x^2+x^6}$
11	$\lim_{x\to 2}\frac{4x^3-32}{5x^2-20}$	12	$\lim_{x\to 4^-}\frac{5}{x-4}$
13	$\lim_{x\to 0}\frac{4}{x}\sin\left(\frac{x}{5}\right)$	14	Find the domain and range of the function $f(x)=\sqrt{x^2-9}+1$
15	$\lim_{x\to 1}\frac{4x^3-5}{5x^2-6}$	16	Determine if the following function is even, odd or neither: $f(x)=3x^3-5x$
17	$\lim_{x\to 2^+}\frac{2x-2}{x-4}$	18	Write the equation of the line perpendicular to 3x - 4y = 12 that passes through the point (-3, 1)
19	$\lim_{x\to-\infty}\frac{8x^2-2x^3}{2x^2+4x}$	20	Graph $f(x)=\begin{cases}x^2-4; & x\le -3\\ x+3; & -3<x<2\\ -x+2; & x\ge 2\end{cases}$

Use the following graph of $f(x)$ to answer the next five questions



21 $\lim_{x\to 1^+} f(x)$	22 $\lim_{x\to 1^-} f(x)$	23 $\lim_{x\to 1} f(x)$	24 $\lim_{x\to -1} f(x)$	25 $\lim_{x\to 2} f(x)$

Use the graph of $f(x)$ below to answer 26 a-c



26a) Use the 3-part definition of continuity to show if f(x) is continuous at x = 3

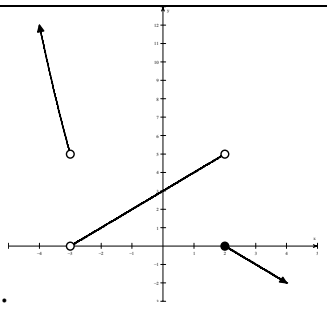
26b) What kind(s) of discontinuity are shown in the graph of $f(x)$?

26c) If there is a removable discontinuity? If so, assign a value to remove it.

27	If $f(x)=\begin{cases}2x-1; & x\le 1\\ -3x+1; & x>1\end{cases}$ use the definition of continuity to show if f(x) is continuous at x = 1
28	If $f(x)=\begin{cases}\dfrac{x^2+6x+8}{x+2}; & x\ne -2\\ 2; & x=-2\end{cases}$ use the definition of continuity to show if f(x) is continuous at x = -2
29	If $f(x)=\dfrac{x^3+8}{x+2}$ use the definition of continuity to show if f(x) is continuous at x = -2
30	When $f(x)=\dfrac{x^3-64}{x-4}$, then f(x) has point discontinuity. Assign a value to f(x) that removes the discontinuity.

Answers:

1. 0	2. 9	3. 15	4. 1	5. 2	6. 0	7. $\frac{3}{2}$
8. 2a-b	9. $-\infty$	10. 0	11. $\frac{12}{5}$	12. $-\infty$	13. $\frac{4}{5}$	14. $d=\{x\le -3 \text{ or } x\ge 3\}$ $r=[1,\infty)$
15. 1	16. odd	17. –1	18. $y-1=\frac{-4}{3}(x+3)$	19. ∞	20. graph below	21. 1
22. –2	23. DNE	24. 2	25. 1	26a. below	26b. point, & infinite	26c. yes let f(x) =2
27. below	28. below	29. below	30. let f(4) = 48 see below			

20. 	26a. 1. $f(3)$ *exists* $[f(3)=3]$ 2. $\lim_{x\to 3} f(x)$ exists $\left[\lim_{x\to 3^+} f(x)=\lim_{x\to 3^-} f(x)=2\right]$ 3. $f(3)\ne\lim_{x\to 3} f(x)\therefore f(x)$ is not continuous at x=3
27. 1. $f(1)$ *exists* $[f(1)=1]$ 2. $\lim_{x\to 1} f(x)$ DNE $\left[\lim_{x\to 1^+} f(x)=1\ne\lim_{x\to 1^-} f(x)=-2\right]$ $\therefore f(x)$ is not continuous at x = 1	28. 1. $f(-2)$ *exists* $[f(-2)=2]$ 2. $\lim_{x\to -2} f(x)$ exists $\left[\lim_{x\to -2^+} f(x)=\lim_{x\to -2^-} f(x)=2\right]$ 3. $f(-2)=\lim_{x\to -2} f(x)=2\therefore f(x)$ is continuous at x=-2
29. 1. $f(-2)$ DNE $[f(-2)=12]$ $\therefore f(x)$ is not continuous at x=-2	30. $\dfrac{x^3-64}{x-4}\to\dfrac{(x-4)(x^2+4x+16)}{(x-4)}\to(x^2+4x+16)$ if x ≠ 4