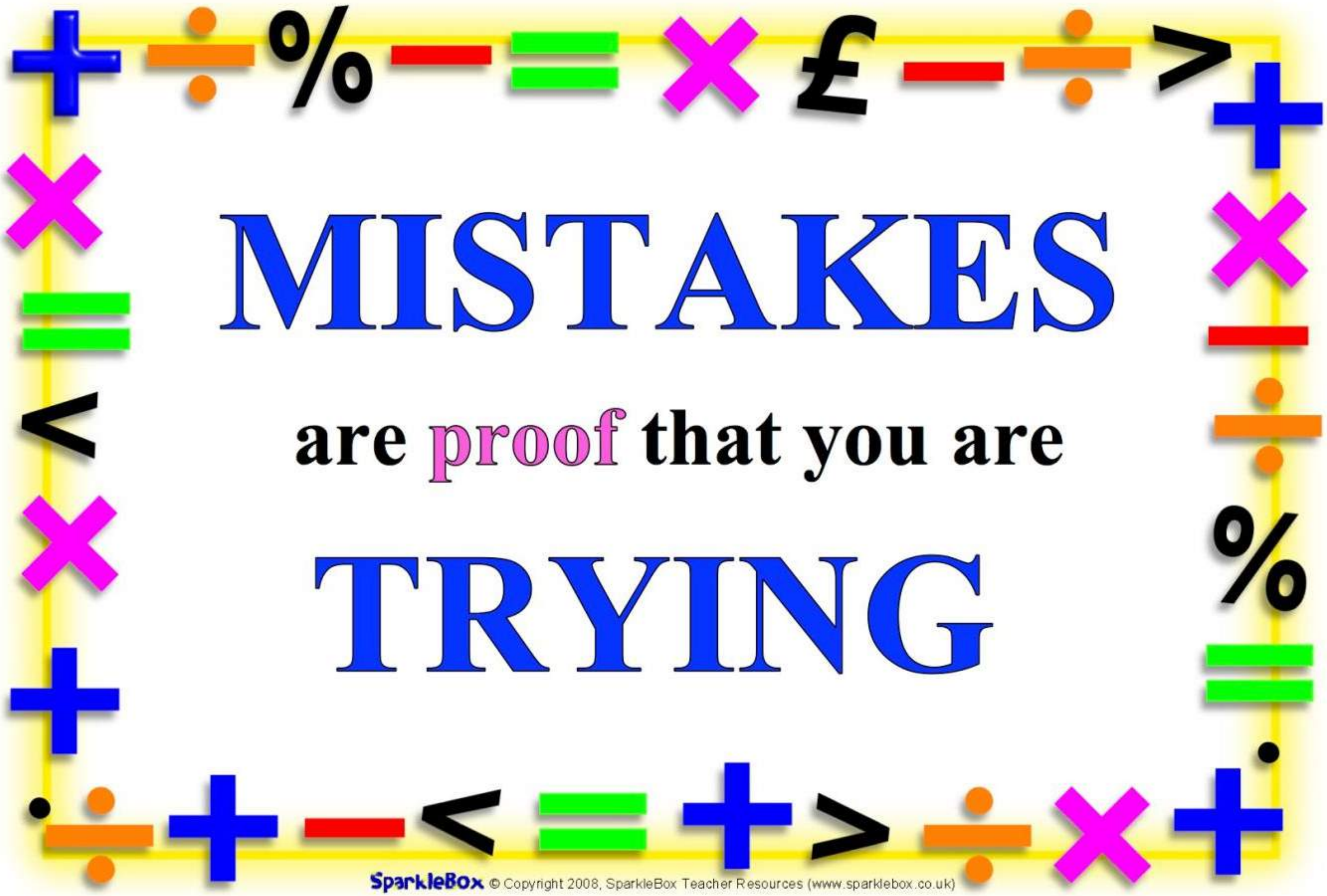
MISTAKES
are proof that you are
TRYING
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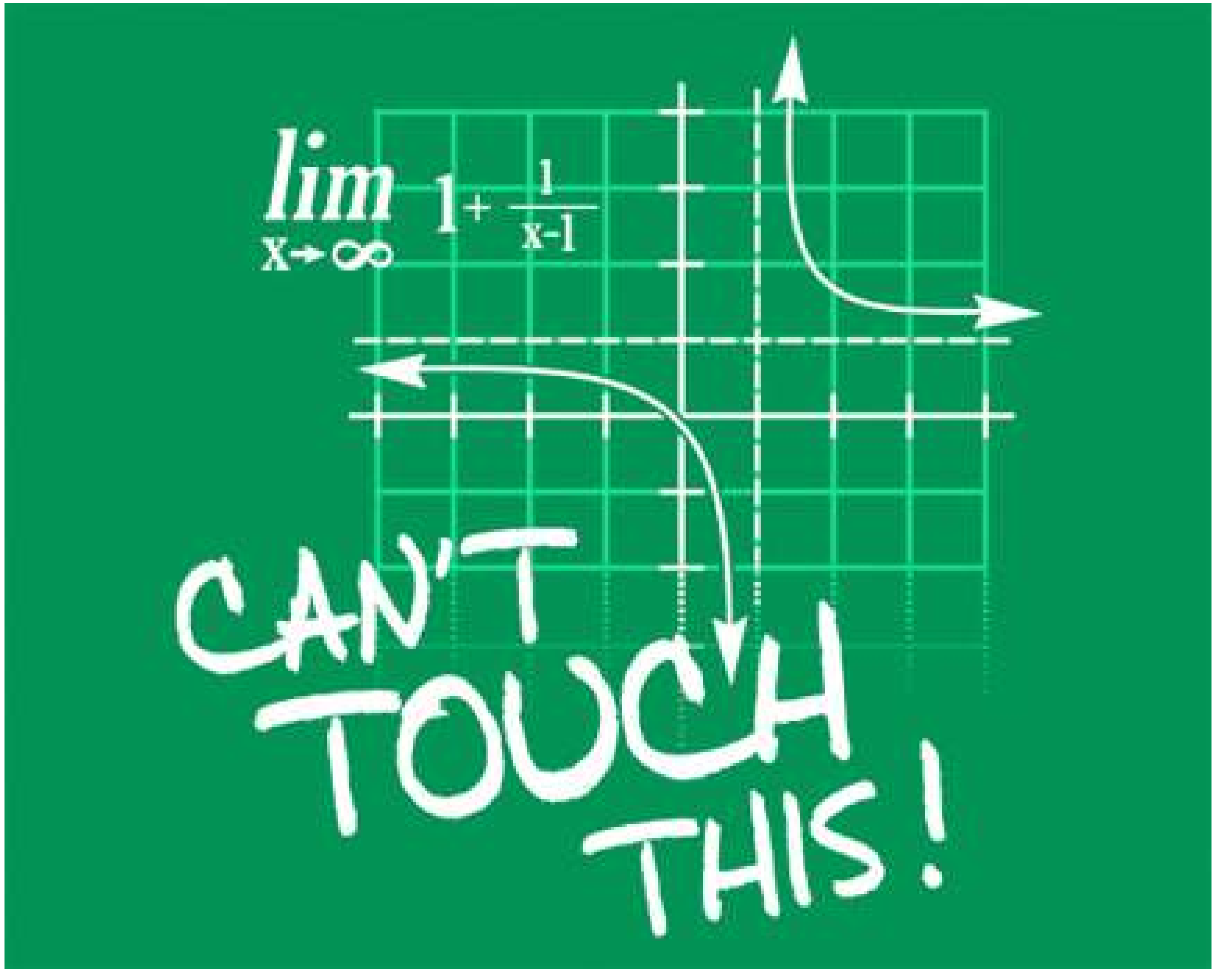

$\lim_{x \to \infty} 1 + \frac{1}{x-1}$
CAN'T
TOUCH
THIS!

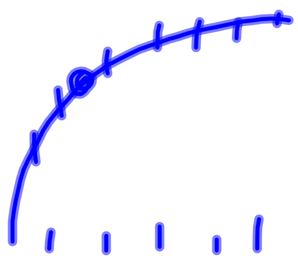
1. Exponential Function

x	-7	-4	-1	2	5	8	11
$H(x)$	-125	-13	1	2.75	2.969	2.996	2.999

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

b) $\lim\limits_{x\to-1} H(x) =$ 1

c) $\lim\limits_{x\to\infty} H(x) =$ 3



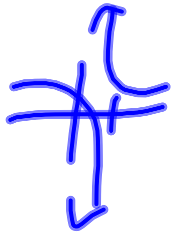
2. Rational Function

Hole VA

x	-1000	-2.001	-2	-1.999	0.999	1	1.001	1000
$G(x)$	0.998	0.333	Undefined	0.333	-1999	Undefined	2001	1.002

a) $\lim_{x\to-\infty} G(x) = 1$

b) $\lim_{x\to-2^-} G(x) = \frac{1}{3}$



c) $\lim_{x\to-2^+} G(x) = \frac{1}{3}$

d) $\lim_{x\to-2} G(x) = \frac{1}{3}$

e) $\lim_{x\to1^-} G(x) = -\infty$

f) $\lim_{x\to1^+} G(x) = +\infty$

g) $\lim_{x\to1} G(x) =$ DNE

h) $\lim_{x\to\infty} G(x) = 1$ (HA?)

3. Rational Function

Hole VA

x	-10000	0.999	1	1.001	3.999	4	4.001	10000
$H(x)$	1.9999	-2.331	Undefined	-2.335	-12998	Undefined	13002	2.001

a) $\lim_{x\to\infty} H(x) =$ 2

b) $\lim_{x\to 1} H(x) =$ $-2.3 \approx -7/3$

c) $\lim_{x\to 4^+} H(x) =$ $+\infty$

d) $\lim_{x\to 4^-} G(x) =$ H $-\infty$

e) $\lim_{x\to 4} G(x) =$ H DNE

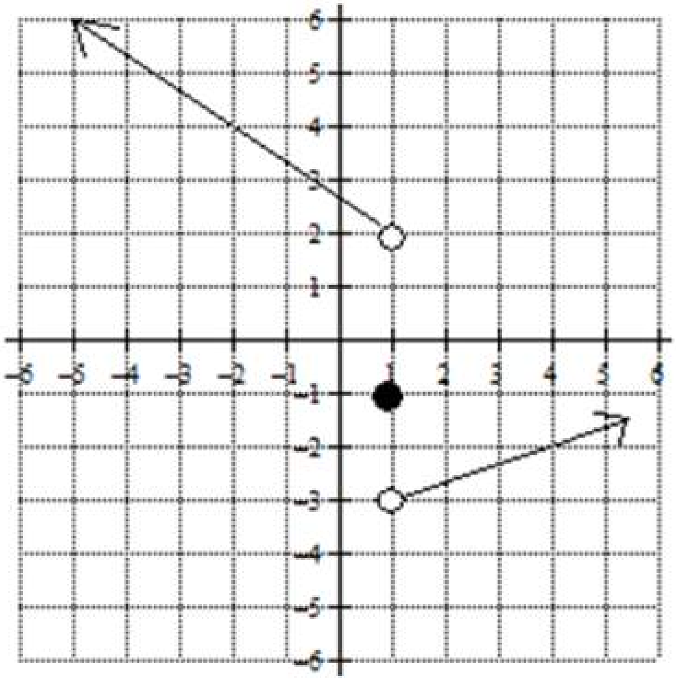
characteristics

At $x=1$ hole

At $x=4$ VA

*NOTE - Correct HW

4. The graph of $h(x)$ is given.



a) $\lim_{x \to 1^-} h(x) = 2$

b) $\lim_{x \to 1^+} h(x) = -3$

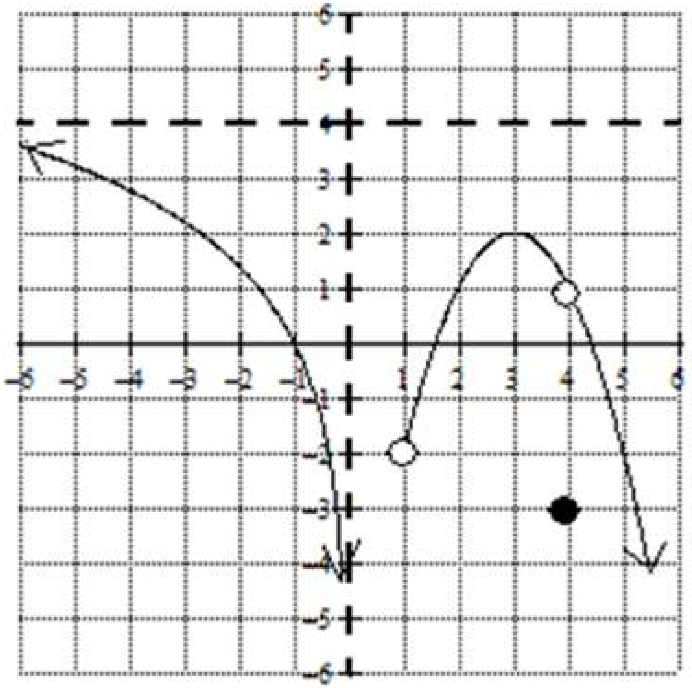
c) $\lim_{x \to 1} h(x) =$ DNE

d) $h(1) = -1$

e) $h(-2) = 4$

f) $\lim_{x \to -2} h(x) = 4$

5. The graph of $g(x)$ is given.



a) $\lim_{x \to 0^-} g(x) = -\infty$

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

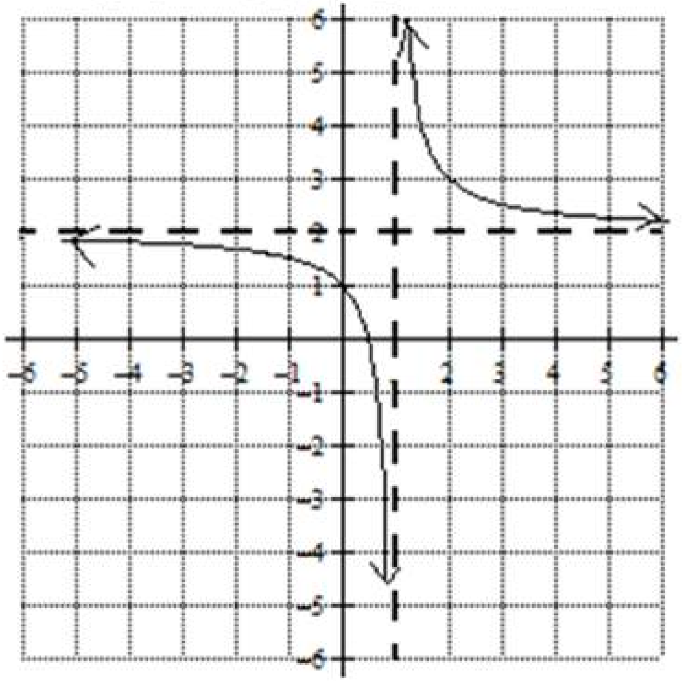
c) $\lim_{x \to -\infty} g(x) = 4$

d) $\lim_{x \to 4} g(x) = 1$

e) $g(4) = -3$

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

6. The graph of $f(x)$ is given.



a) $\lim_{x\to 0} f(x) = 1$

b) $\lim_{x\to -\infty} f(x) = 2$

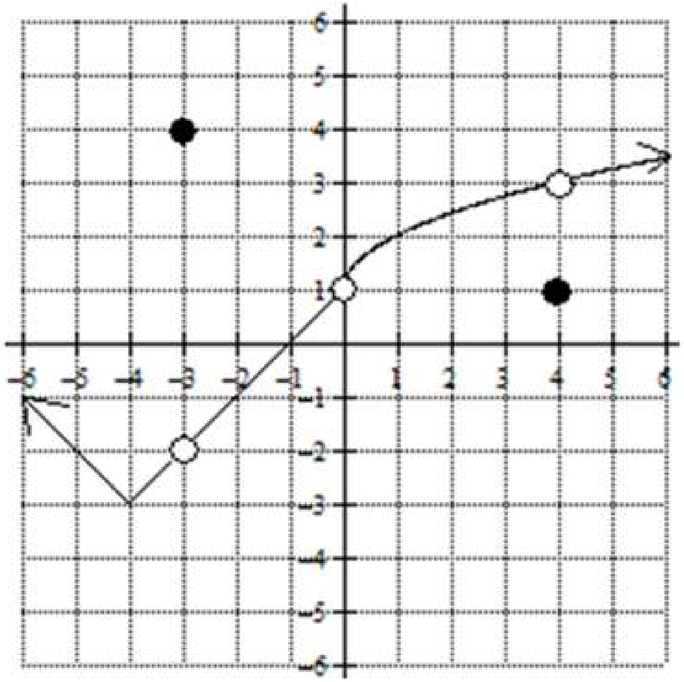
c) $\lim_{x\to \infty} f(x) = 2$

d) $\lim_{x\to 1^+} f(x) = +\infty$

e) $\lim_{x\to 1^-} f(x) = -\infty$

f) $\lim_{x\to 1} f(x) = \text{DNE}$

7. The graph of $q(x)$ is given.



a) $\lim_{x \to 0} q(x) =$ 1

b) $\lim_{x \to -3} q(x) =$ -2

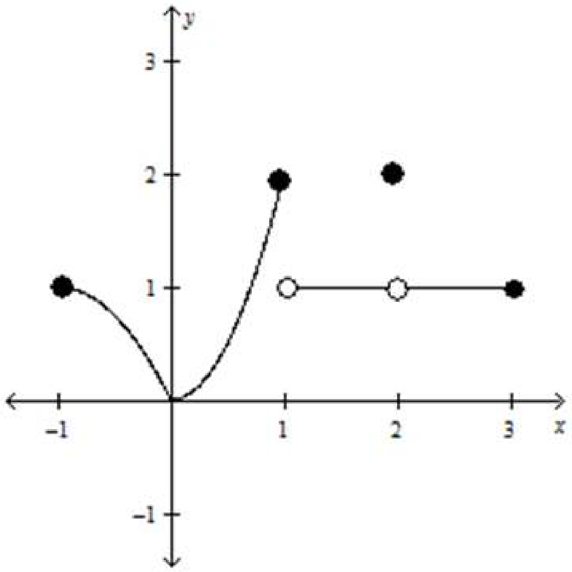
c) $\lim_{x \to 4} q(x) =$ 3

d) $\lim_{x \to -4} q(x) =$ -3

e) $q(-3) =$ 4

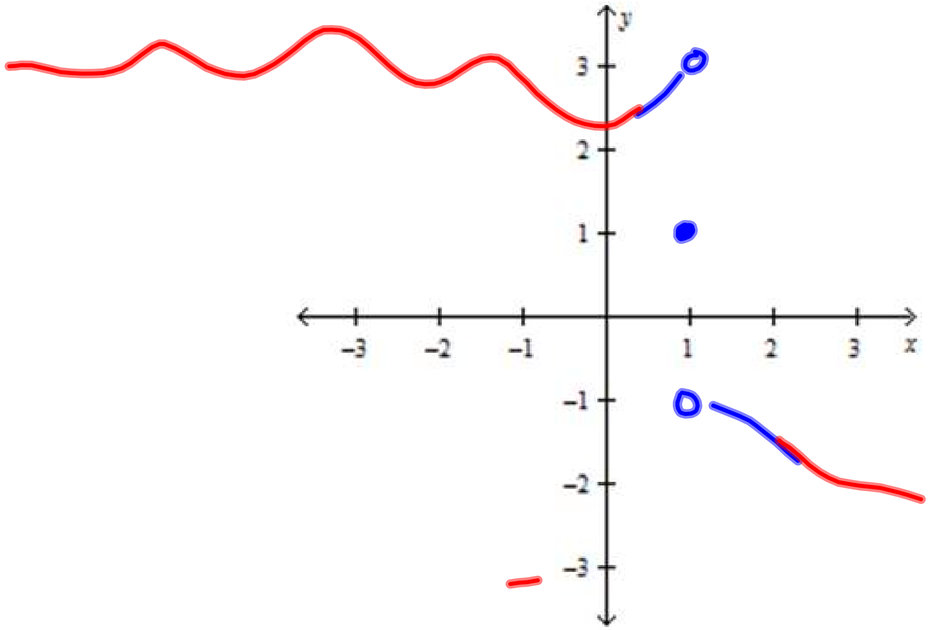
f) $q(4) =$ 1

Given the graph of the function, $g(x)$, below, determine if the statements are true or false. For statements that are false, explain why.



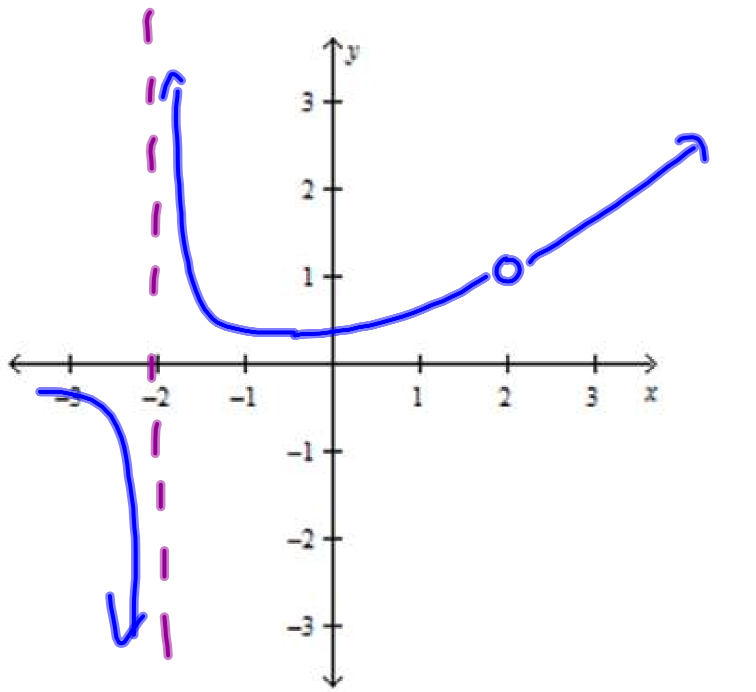
8.	$\lim_{x\to 1} g(x) = 2$ False $g(1)=2$ b/c $\lim_{x\to 2} g(x)$ DNE (left & right limits don't equal)
9.	$\lim_{x\to c} g(x)$ exists for every value of c on the interval $(-1, 1)$. True open
10.	$\lim_{x\to 2} g(x)$ does not exist. False $\left.\begin{array}{l}\lim_{x\to 2^-} g(x)=1 \\ \lim_{x\to 2^+} g(x)=1\end{array}\right\} \therefore \lim_{x\to 2} g(x)=1$

11. $\lim_{x\to 1^-} f(x) = 3 \qquad \lim_{x\to 1^+} f(x) = -1 \qquad f(1) = 1$



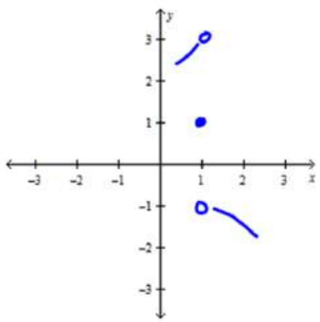
12. $\lim_{x \to -2^-} f(x) = -\infty$ $\lim_{x \to -2^+} f(x) = \infty$ +1p.

$f(2)$ is undefined but $\lim_{x \to 2} f(x)$ exists.



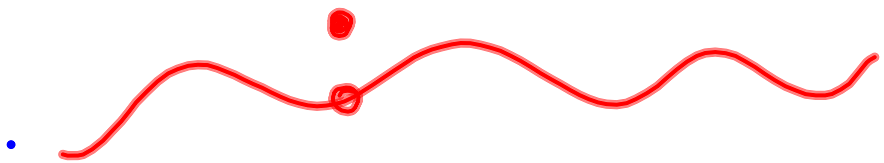
13. In exercise 11, does $\lim_{x \to 1} f(x)$ exist? Explain why or why not.

11. $\lim_{x \to 1^-} f(x) = 3$ $\lim_{x \to 1^+} f(x) = -1$ $f(1) =$



no the $\lim_{x \to 1} f(x)$ DNE

b/c the left-hand limit and right-hand limit do not make At $x=1$



14. $\lim_{x \to -\frac{1}{2}} 3x^2(2x-1)$

$3(-\frac{1}{2})^2(2(-\frac{1}{2})-1)$

$3(\frac{1}{4})(-1-1)$

$3(\frac{1}{4})(-2)$

$\frac{3}{4}(-2)$

$\frac{-6}{4} = \frac{-3}{2}$

15. $\lim_{x \to -1} x^3 + 2x^2 - 3x + 3$

$(-1)^3 + 2(-1)^2 - 3(-1) + 3$

$-1 + 2(1) + 3 + 3$

$-1 + 2 + 3 + 3$

$\lim_{x \to -1} = 7$

16. $\lim_{x \to -2} (x-6)^{2/3}$

$(-2-6)^{2/3}$

$(-8)^{2/3}$

rewrite

$\left(\sqrt[3]{-8}\right)^2$

$(-2)^2 = 4$

17. $\lim_{x \to 2} \frac{x^2+5x+6}{x+2}$

plug in first

$\frac{20}{4} = 5$

don't start here

$\frac{(x+3)(x+2)}{(x+2)}$

18. $\lim\limits_{\theta \to \frac{\pi}{6}} \theta^2 \tan\theta$

$\left(\frac{\pi}{6}\right)^2 \tan\left(\frac{\pi}{6}\right)$

$\left(\frac{\pi^2}{36}\right)\left(\frac{\sqrt{3}}{3}\right) = \frac{\pi^2\sqrt{3}}{108}$

$\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$ $\quad \frac{1}{2} \cdot \frac{2}{\sqrt{3}}$

$\frac{1}{\sqrt{3}}$

$\frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

19. $\lim\limits_{x \to 0} \frac{(x+4)^2 - 16}{x}$

$\frac{(0+4)^2 - 16}{(0)}$

$\frac{0}{0}$ Some work needs to be done

Expand

$\lim\limits_{x \to 0} \frac{x^2 + 8x + 16 - 16}{x}$

$\lim\limits_{x \to 0} \frac{\cancel{x}(x+8)}{\cancel{x}}$

$\lim\limits_{x \to 0} (x+8) = 8$

20. $\lim_{x\to 1} \frac{x-1}{x^2-1} = \frac{0}{0}$

$\lim_{x\to 1} \frac{(x-1)}{(x-1)(x+1)}$

$\lim_{x\to 1} \frac{1}{x+1} = \frac{1}{2}$

21. $\lim_{x\to 2} \frac{x^2-3x+2}{x^2-4} = \frac{0}{0}$

$\lim_{x\to 2} \frac{(x-2)(x-1)}{(x-2)(x+2)}$

$\lim_{x\to 2} \frac{x-1}{x+2} = \frac{1}{4}$

22. $\lim_{x\to 0} \frac{5x^3+8x^2}{3x^4-16x^2}$ $\frac{0}{0}$

$\lim_{x\to 0} \frac{x^2(5x+8)}{x^2(3x^2-16)}$

$\lim_{x\to 0} \frac{5x+8}{3x^2-16} = \frac{8}{-16}$

$= -\frac{1}{2}$

23. $\lim_{x\to 0} \frac{\frac{1}{x+2}-\frac{1}{2}}{x}$ $\frac{0}{0}$

Be careful

$\lim_{x\to 0} \frac{\frac{2-(x+2)}{2(x+2)}}{x}$

$\lim_{x\to 0} \left(\frac{-x}{2(x+2)}\right)\left(\frac{1}{x}\right)$

$\lim_{x\to 0} \frac{-1}{2(x+2)} = \frac{-1}{4}$

24. $\lim_{x\to 0} \frac{(2+x)^3-8}{x}$

$\lim_{x\to 0} \frac{x^3+8x^2+12x+8-8}{x}$

$\lim_{x\to 0} \frac{x(x^2+8x+12)}{x}$

$\lim_{x\to 0} x^2+8x+12 = 12$

Scratch work

$(2+x)^2 = (4+4x+x^2)(2+x)$

$8+8x+2x^2$

$4x+4x^2+x^3$

$8+12x+8x^2+x^3$

careful

25. $\lim_{h\to 0} \frac{(x+h)^2+2(x+h)-3-(x^2+2x-3)}{h}$

$\lim_{h\to 0} \frac{x^2+2xh+h^2+2x+2h-3-x^2-2x+3}{h}$

$\lim_{h\to 0} \frac{2xh+h^2+2h}{h}$ $\frac{0}{0}$

$\lim_{h\to 0} \frac{h(2x+h+2)}{h}$

$\lim_{h\to 0} 2x+h+2 = 2x+2$

26. $\lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$ if $f(x) = 3x^2 - 2x$

$$\lim_{h \to 0} \frac{3(x+h)^2 - 2(x+h) - (3x^2 - 2x)}{h}$$ ← must protect the group

$$\lim_{h \to 0} \frac{3(x^2+2xh+h^2) - 2x - 2h - 3x^2 + 2x}{h}$$

$$\lim_{h \to 0} \frac{3x^2 + 6xh + 3h^2 - 2x - 2h - 3x^2 + 2x}{h}$$

typo on homework should be "h" going to zero not x

$$\lim_{h \to 0} \frac{6xh + 3h^2 - 2h}{h}$$

$$\lim_{h \to 0} \frac{h(6x + 3h - 2)}{h}$$

$$\lim_{h \to 0} 6x + 3h - 2 = 6x - 2$$

27. $\lim_{x \to 2} f(x)$ if $f(x) = \begin{cases} 2x^2 - 4x, & x < 2 \\ 4\sin\left(\frac{\pi x}{4}\right), & x > 2 \end{cases}$

$\lim_{x \to 2^-} f(x)$

$\lim_{x \to 2^-} 2x^2 - 4x$

$= 0$

$\neq$

$\lim_{x \to 2^+} f(x)$

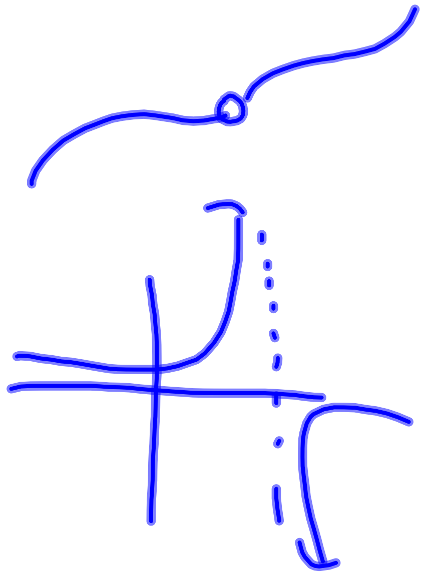
$\lim_{x \to 2^-} 4\sin\left(\frac{\pi x}{4}\right)$

$\lim_{x \to 2^-} 4\sin\underbrace{\left(\frac{\pi}{2}\right)}$

$4 \cdot 1$

4

DNE



28. $\lim_{x\to 3} e^x \cos\left(\frac{\pi x}{3}\right)$

$e^3 \cos\left(\frac{3\pi}{3}\right)$

$e^3 (\cos \pi)$

$-1e^3$

29. $\lim_{x\to 1} \frac{\sqrt{x+3}-2}{x-1}$ $\frac{0}{0}$

$\lim_{x\to 1} \frac{\sqrt{x+3}-2}{(x-1)}\left(\frac{\sqrt{x+3}+2}{\sqrt{x+3}+2}\right)$

$\lim_{x\to 1} \frac{x+3-4}{(x-1)(\sqrt{x+3}+2)}$

$\lim_{x\to 1} \frac{(x-1)}{(x-1)(\sqrt{x+3}+2)}$

$= \frac{1}{2+2}$

$\frac{1}{4}$

30. $\lim_{x \to 3^+} \frac{x+3}{x-3}$

VA at 3

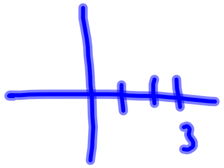
DNE

$+\infty$

reason

for more info

Approach from #'s on the right



like 4

$\frac{x+3}{x-3}$ at $x=4$

$\frac{+}{+}$ has positive values

So $+\infty$

31. $\lim_{x \to -3^+} \frac{2x^2-9x+9}{x^2-9}$

$(2x-3)(x-3)$

$(x-3)(x+3)$

VA at $x=-3$

DNE

$-\infty$

for more info:

-3 from right so I choose $x=0$

$\frac{2x-3}{x+3}$ at $x=0$ $\frac{-}{+}$

neg values

So $-\infty$

32. $\lim_{x\to 0} \frac{\frac{1}{x-2}+\frac{1}{2}}{x}$ $\frac{0}{0}$

cd

$\lim_{x\to 0} \frac{\frac{2+(x-2)}{2(x-2)}}{x}$

$\lim_{x\to 0} \frac{x}{2(x-2)\cdot x}$

$\lim_{x\to 0} \frac{1}{2(x-2)}$ $= -\frac{1}{4}$

33. $\lim_{x\to -2} \begin{cases} 2-x, & x<-2 \\ x^2-2x, & x>-2 \end{cases}$

Piecewise

Look at $x=-2$ from both sides

$\lim_{x\to -2^-} 2-x = 4$

$\lim_{x\to -2^+} x^2-2x = 8$

$4-2(-2)$
$4+4$

don't match

limit

DNE

34. If $\lim_{x\to 3} f(x) = 2$ and $\lim_{x\to 3} g(x) = -4$, find each of the following limits. Show your analysis applying the properties of limits.

a. $\lim_{x\to 3}\left[\frac{5f(x)}{g(x)}\right]$

$$\frac{5\lim_{x\to 5} f(x)}{\lim_{x\to 3} g(x)} = \frac{5\cdot(2)}{-4}$$

$$= \frac{10}{-4}$$

$$= -\frac{5}{2}$$

b. $\lim_{x\to 3}\left[f(x) + 2g(x)\right]$

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

$$2 + 2(-4)$$

$$2 - 8$$

$$-6$$

c. $\lim_{x\to 3}\sqrt{4f(x)}$

$$2\sqrt{\lim_{x\to 3} f(x)}$$

$$2(\sqrt{2})$$

$$2\sqrt{2}$$

34. If $\lim_{x\to 3} f(x) = 2$ and $\lim_{x\to 3} g(x) = -4$, find each of the following limits. Show your analysis applying the properties of limits.

d. $\lim_{x\to 3} \frac{g(x)}{8}$

$\frac{1}{8} \lim_{x\to 3} g(x)$

$\frac{1}{8} \cdot (-4)$

$-\frac{1}{2}$

e. $\lim_{x\to 3} [3f(x) - g(x)]$

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

$3(2) - (-4)$

$6 + 4$

10

f. $\lim_{x\to 3} \left[\frac{f(x)g(x)}{12}\right]$

$\frac{1}{12}\left[\lim_{x\to 3} f(x) \cdot \lim_{x\to 3} g(x)\right]$

$\frac{1}{12}[2 \cdot (-4)]$

$\frac{1}{12}[-8]$

$-\frac{2}{3}$

35. If $\lim_{x\to 4} f(x) = 0$ and $\lim_{x\to 4} g(x) = 3$, find each of the following limits. Show your analysis applying the properties of limits.

a. $\lim_{x\to 4}\left[\dfrac{g(x)}{f(x)-1}\right]$

$$\frac{\lim_{x\to 4} g(x)}{\lim_{x\to 4} f(x) - 1}$$

$$\frac{3}{0-1} \quad \frac{3}{-1} \quad -3$$

b. $\lim_{x\to 4} xf(x)$

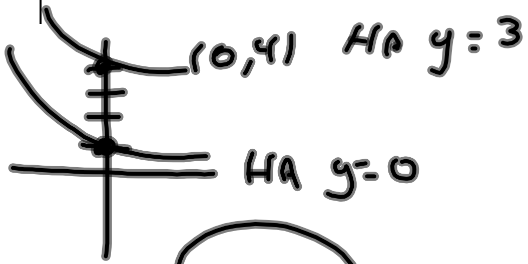
$$\lim_{x\to 4} x \cdot \lim_{x\to 4} f(x)$$

$$4 \cdot 0$$

$$0$$

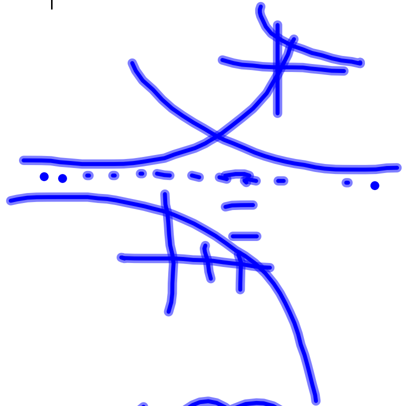
Find the limit of each of the following exponential functions. Sketch a graph of each function to aid in your determination of the limit.

36. $\lim_{x\to\infty} -(0.5)^{-x-2}+3$	37. $\lim_{x\to\infty} 2^{-x-2}+3$	38. $\lim_{x\to-\infty} -\left(\frac{1}{4}\right)^{-x-2}+3$



$-\infty$

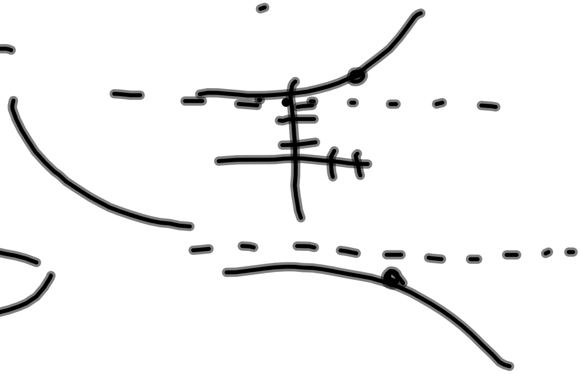
3



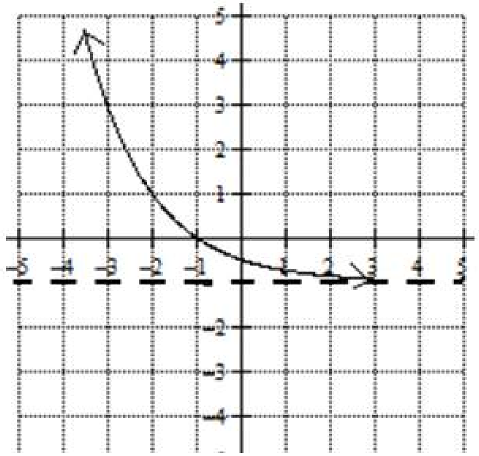
3

pt	HA
(0,1)	y=0
(0,4)	y=3
(2,4)	y=3

(2,-4)



39. Using the graph of $g(x)$ pictured to the right, find each of the following limits.



a. $\lim_{x\to\infty} g(x) =$ -1

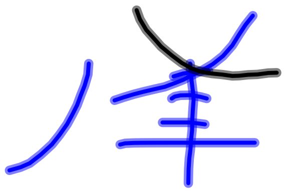
b. $\lim_{x\to-\infty} g(x) =$ $+\infty$ (DNE)

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

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

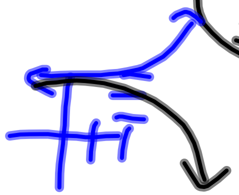
Warm-ups

$\lim\limits_{x\to 0} \frac{1-\cos(\text{blob})}{\text{blob}} = 0$ $\lim\limits_{x\to 0} \frac{\sin(\text{blob})}{\text{blob}}$



$$\lim_{x\to\infty}\left(\frac{3}{2}\right)^{-x}+3$$

3



$$\lim_{x\to -\infty} -(3)^{x-2}+3$$

3

$$\lim_{x\to 0}\frac{2\sin(2x)}{5x}$$

$\frac{2}{5}\lim\limits_{x\to 0} 2 \cdot \frac{\sin(2x)}{2x}$

$\frac{4}{5}$

$$\lim_{x\to 0}\frac{2x}{5\sin(2x)}$$

$\frac{1}{5}(1) = \frac{1}{5}$

$$\lim_{x\to 0}\frac{1-\cos(3x)}{5x}$$

$\frac{1}{5}\lim\limits_{x\to 0} 3\left(\frac{1-\cos(3x)}{3x}\right)$

$\frac{1}{5}(3)\cdot 0$

0

Find the value of each limit. For a limit that does not exist, state why.

40. $\lim_{\theta \to \frac{\pi}{2}} \frac{\cos^2 \theta}{1-\sin\theta}$ $\cos^2\theta + \sin^2\theta = 1$	41. $\lim_{x \to 0} \frac{x+\sin x}{x}$ $\frac{0}{0}$

$$\lim_{\theta \to \pi/2} \frac{1-\sin^2\theta}{1-\sin\theta}$$

$$\lim_{\theta \to \pi/2} \frac{(1-\sin\theta)(1+\sin\theta)}{(1-\sin\theta)}$$

$$\lim_{\theta \to \pi/2} 1+\sin\theta$$

$$1+1=2$$

split up

$$\lim_{x \to 0} \left(\frac{x}{x} + \frac{\sin x}{x}\right)$$

$$\lim_{x \to 0} \frac{x}{x} + \lim_{x \to 0} \frac{\sin x}{x}$$

$$\lim_{x \to 0} 1 + \lim_{x \to 0} \frac{\sin x}{x}$$

$$1 + 1$$

$$2$$

42. $\lim_{x\to 3} \begin{cases} 2x^2 - 3x, & x < 3 \\ 8 - \cos\left(\frac{\pi x}{3}\right), & x > 3 \end{cases}$

$\lim_{x\to 3^-} 2x^2 - 3x = 9$

$18 - 9$

$\lim_{x\to 3^+} 8 - \cos\frac{\pi x}{3} = 9$

$8 - -1$

$\lim_{x\to 3} \begin{cases} 2x^2 - 3x & x<3 \\ 8 - \cos\frac{\pi x}{3} & x>3 \end{cases} = 9$

43. $\lim_{\theta\to 0} \frac{2\sin 3\theta}{\theta}$

$\lim_{\theta\to 0} 3 \cdot \frac{2\sin 3\theta}{3\theta}$

$2 \lim_{\theta\to 0} \frac{3\sin 3\theta}{3\theta}$

$\lim_{\theta\to 0} \frac{6 \cdot \sin 3\theta}{1 \cdot 3\theta}$

$2 \cdot 3$

6

$6 \lim_{\theta\to 0} \frac{\sin 3\theta}{3\theta}$

$6 \cdot 1$

6

$\lim_{x\to 0} \frac{\sin x}{x}$

44. $\lim_{x\to 0} \frac{\sin x}{2x^2 - x}$

factor

$$\lim_{x\to 0} \frac{\sin x}{x(2x-1)}$$

rewrite

$$\lim_{x\to 0} \frac{\sin x}{x} \cdot \frac{1}{2x-1}$$

$$\lim_{x\to 0} \frac{\sin x}{x} \cdot \lim_{x\to 0} \frac{1}{2x-1}$$

$$1 \cdot (-1) = -1$$

45. $\lim_{x\to 0} \frac{5x+\sin 3x}{x}$

rewrite

$$\lim_{x\to 0} \frac{5x}{x} + \lim_{x\to 0} \frac{\sin 3x}{x}$$

$$\lim_{x\to 0} 5 + \lim_{x\to 0} \frac{3\sin 3x}{3 \cdot x}$$

$$5 + 3 \underbrace{\lim_{x\to 0} \frac{\sin 3x}{3x}}$$

$$5 + 3 \cdot (1)$$

$$8$$

46. $\lim\limits_{x \to 0} \dfrac{\sin 2x}{6x}$

rewrite

$\lim\limits_{x \to 0} \dfrac{\sin 2x}{3 \cdot 2x}$

$\dfrac{1}{3} \underbrace{\lim\limits_{x \to 0} \dfrac{\sin 2x}{2x}}$

$\dfrac{1}{3} \cdot 1$

$1/3$

47. $\lim\limits_{x \to 0} \dfrac{2 \sin 4x}{3x}$

$\dfrac{2}{3} \lim\limits_{x \to 0} \dfrac{4 \cdot \sin 4x}{4x}$

$\dfrac{8}{3} \underbrace{\lim\limits_{x \to 0} \dfrac{\sin 4x}{4x}}$

$\dfrac{8}{3} \cdot 1$

$8/3$

48. $\lim_{\theta \to 0} \frac{\cos\theta \tan\theta}{3\theta}$

$$\lim_{\theta \to 0} \frac{\cos\theta \cdot \frac{\sin\theta}{\cos\theta}}{3\theta}$$

$$\lim_{\theta \to 0} \frac{\sin\theta}{3\theta}$$

$$\lim_{\theta \to 0} \frac{1}{3} \cdot \frac{\sin\theta}{\theta}$$

$$\frac{1}{3} \underbrace{\lim_{x \to 0} \frac{\sin\theta}{\theta}}$$

$$\frac{1}{3} \cdot 1 = 1/3$$

49. $\lim_{\theta \to 0} \frac{3 - 3\cos\theta}{\theta}$

$$\lim_{\theta \to 0} \frac{3(1 - \cos\theta)}{\theta}$$

$$3 \underbrace{\lim_{\theta \to 0} \frac{1 - \cos\theta}{\theta}}$$

$$3 \cdot 0$$

$$0$$

50. $\lim_{\theta \to \frac{\pi}{2}} \frac{\cos\theta}{\cot\theta}$ $\frac{0}{0}$

$\lim_{\theta \to \pi/2} \frac{\cos\theta}{\frac{\cos\theta}{\sin\theta}}$

$\lim_{\theta \to \pi/2} \cos\theta \cdot \frac{\sin\theta}{\cos\theta}$

$\lim_{\theta \to \pi/2} \sin\theta$

$\sin(\pi/2) = 1$

51. $\lim_{\theta \to 0} \frac{1-\tan\theta}{\sin\theta - \cos\theta}$

plug in :)

$\frac{1-0}{0-1} = \frac{1}{-1}$

-1

52. $\lim\limits_{c\to 3} \frac{c^3-27}{c-3}$

$\lim\limits_{c\to 3} \frac{(c-3)(c^2+3c+9)}{(c-3)}$

$\lim\limits_{c\to 3} c^2+3c+9$

$9+9+9$

27

1
1 1
1 2 1
1 3 3 1

53. $\lim\limits_{x\to -1} \frac{(x+3)^3-8}{x+1}$

$\lim\limits_{x\to -1} \frac{x^3+3x^2\cdot 3^1+3x\cdot 3^2+1x^0 3^3-8}{(x+1)}$

$\lim\limits_{x\to -1} \frac{x^3+9x^2+27x+27-8}{(x+1)}$

$\lim\limits_{x\to -1} \frac{x^3+9x^2+27x+19}{(x+1)}$ synthetic division

next page

$\lim\limits_{x\to -1} \frac{(x+1)(x^2+8x+19)}{(x+1)}$

$1-8+19=12$

$$\frac{x^3+9x^2+27x+19}{(x+1)}$$

$$\begin{array}{r|rrrr}
-1 & 1 & 9 & 27 & 19 \\
 & 1 & -1 & -8 & -19 \\
\hline
 & 1 & 8 & 19 & \boxed{0}
\end{array}$$

so $(x+1)(x^2+8x+19)$

$a^3 \pm b^3$ SOAP

$(a)^3 \pm (b)^3$

Same

$(a \pm b)(a^2 \mp ab + b^2)$

$- \quad + \quad +$

$a^3 - 8$

$8x^3 - 27y^3$

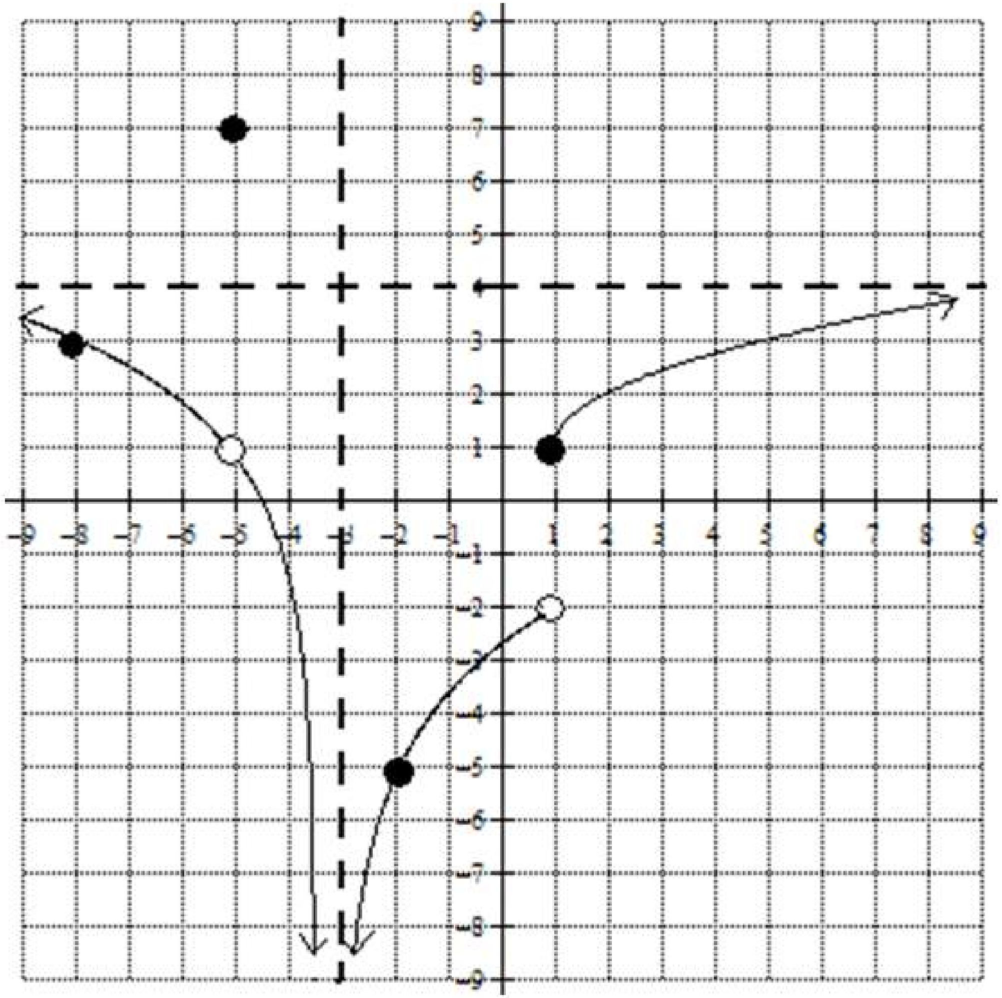
$(2x)^3 - (3y)^3$

$(2x - 3y)(4x^2 + 6xy + 9y^2)$

$(x+3)^3$ $(x+3)(x+3)(x+3)$

$(x^2 + 6x + 9)(x+3)$

x^3



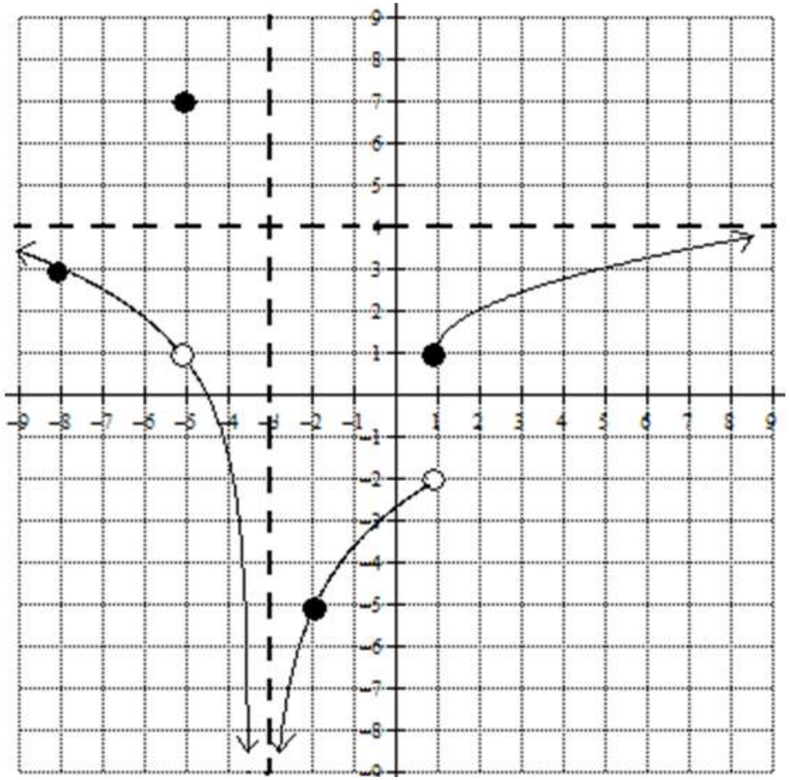
54. $\lim_{x \to \infty} F(x) =$ 4

55. $\lim_{x \to 2} F(x) =$ 2

56. $\lim_{x \to -2^-} F(x) =$ -5

57. $\lim_{x \to -2^+} F(x) =$ -5

58. $\lim_{x \to -2} F(x) =$ -5



59. $F(-4.5) =$ 0

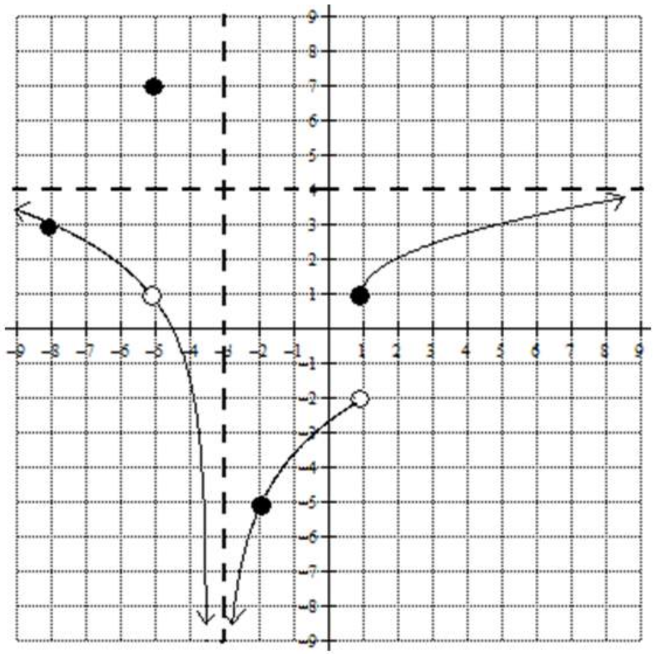
60. $\lim_{x \to -5} F(x) =$ 1

61. $F(-5) =$ 7

62. $F(1) =$ __________

63. $\lim_{x \to 1^+} F(x) =$ __________

64. $\lim_{x \to 1^-} F(x) =$ _______



65. $\lim_{x \to 1} F(x) =$ ___1___

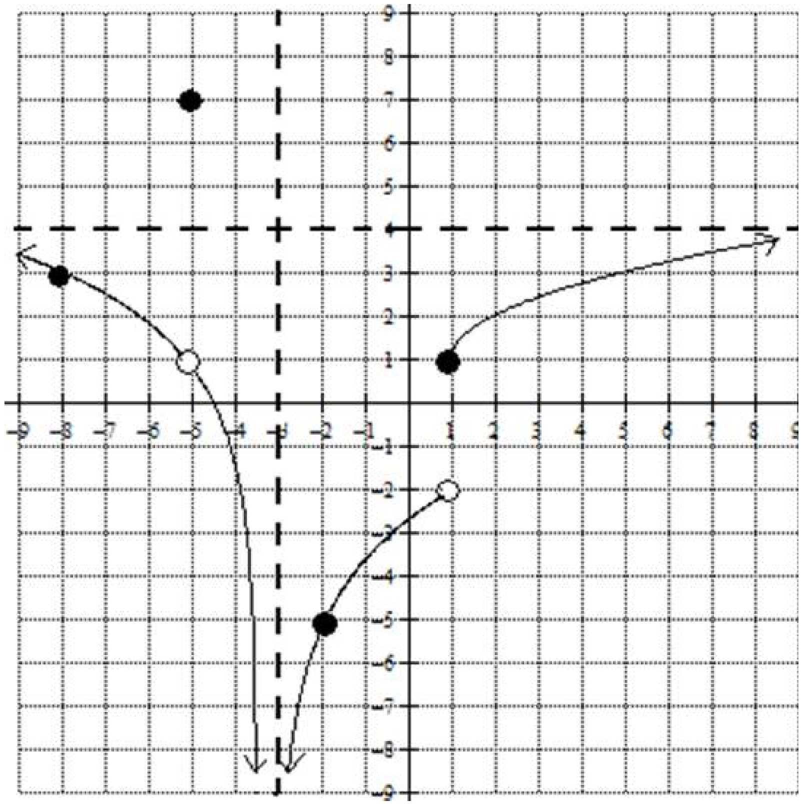
66. $\lim_{x \to -3^+} F(x) =$ ___1___

67. $\lim_{x \to -3^-} F(x) =$ ___-2___

68. $F(-2) =$ ___-5___

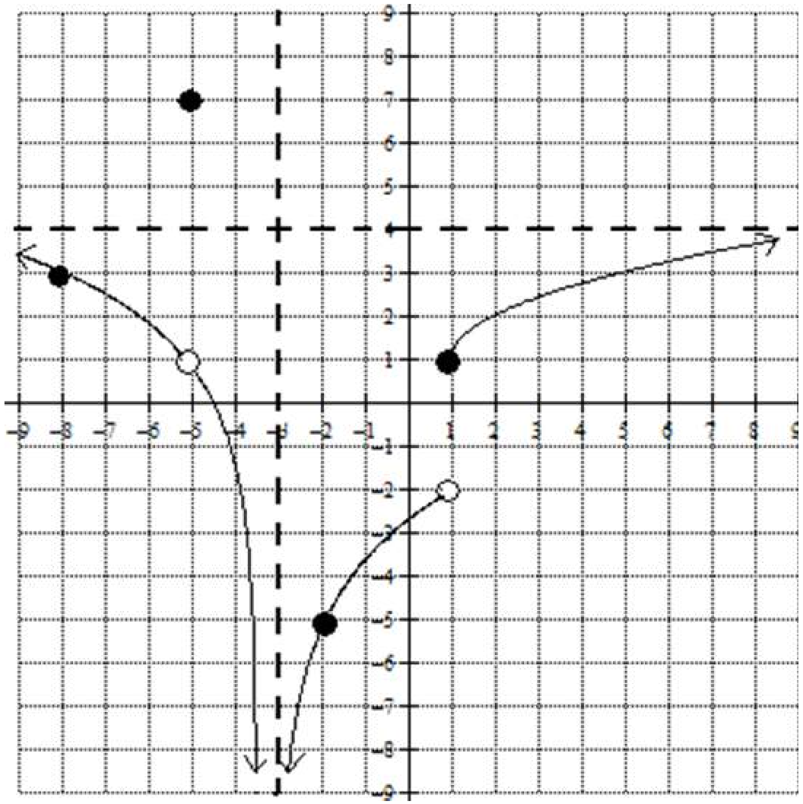
69. $F(-3) =$ ___DNE___ VA

Determine if the function is continuous at each of the indicated values below. Use the three part definition of continuity to perform your analysis.



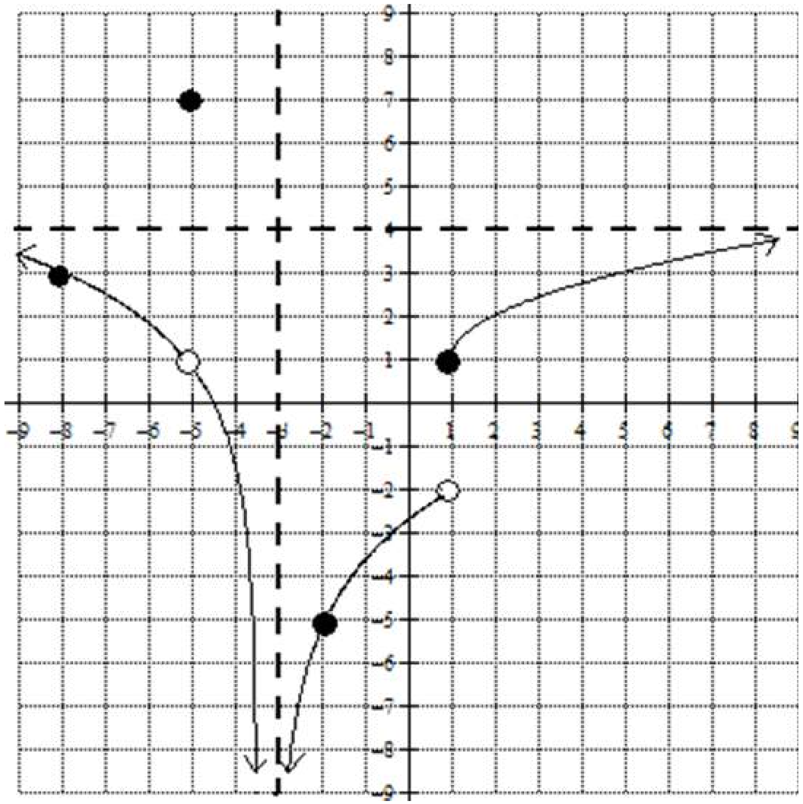
70. $x = -5$

Determine if the function is continuous at each of the indicated values below. Use the three part definition of continuity to perform your analysis.



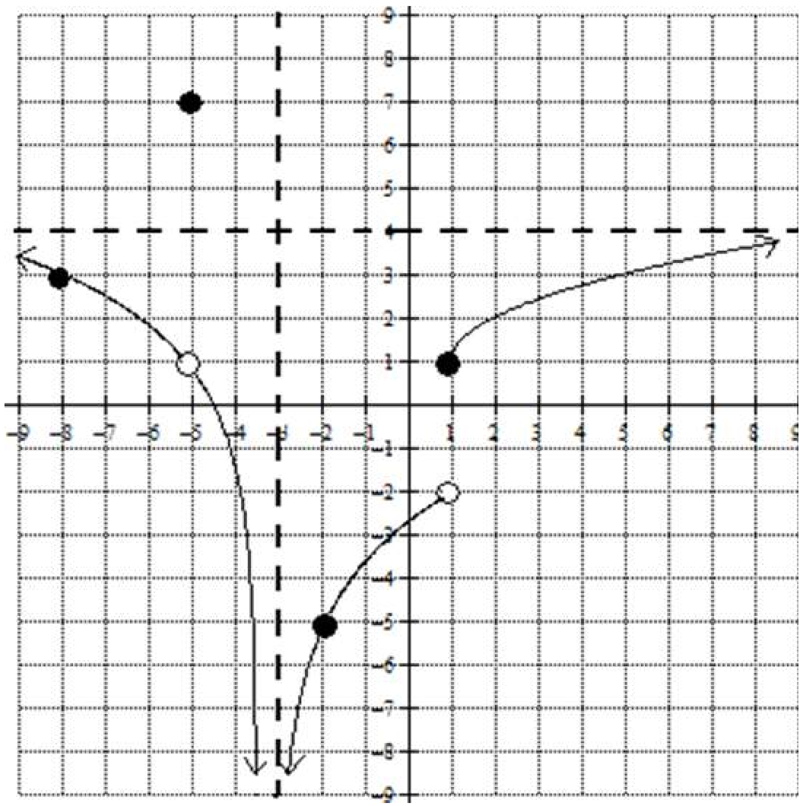
71. $x = 1$

Determine if the function is continuous at each of the indicated values below. Use the three part definition of continuity to perform your analysis.



72. $x = -3$

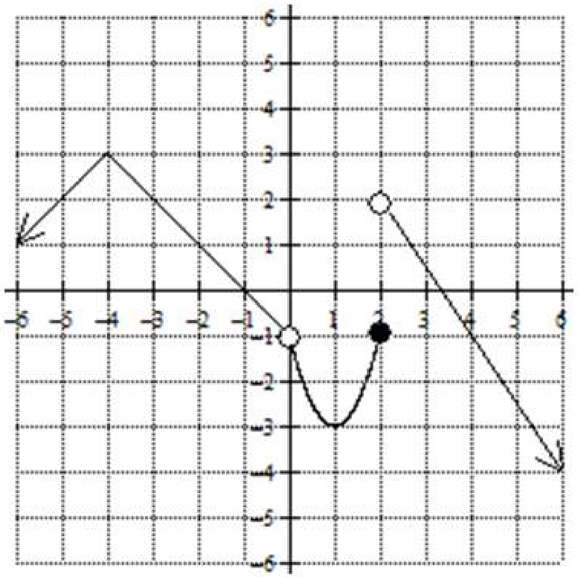
Determine if the function is continuous at each of the indicated values below. Use the three part definition of continuity to perform your analysis.



73. $x = -2$

Write a discussion of continuity for each of the functions below. Be sure to include in your discussion where the function is continuous, and, for the values where the function is not continuous, use the three part definition to establish discontinuity.

74. Graph of $g(x)$



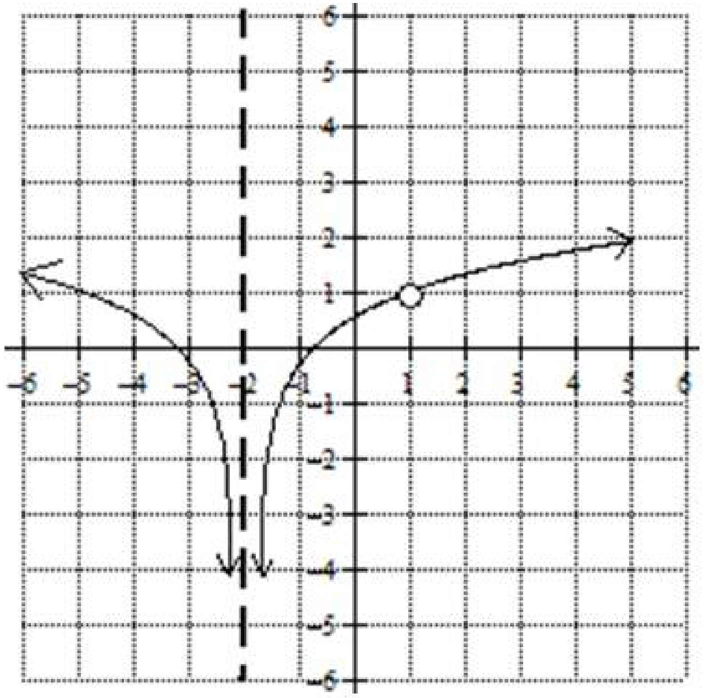
include

- removeable discontinuity
- jump disc limit from left ≠ limit from right

- Continuous everywhere except $x=0$ and $x=2$

then show why not

75. Graph of $h(x)$



Don't say VA w/out proving it exists by limits

- don't say removable disc without proving it exist by limits

$\lim_{x \to -2^-} h(x) = -\infty \therefore DNE$

Find the value of a that makes each of the functions below everywhere continuous. Write the two limits that must be equal in order for the function to be continuous.

$$76. \quad f(x) = \begin{cases} 4 - x^2, & x < -1 \\ ax^2 - 1, & x \geq -1 \end{cases}$$

$$\lim_{x \to -1^-} f(x) \quad \textit{must} \quad \textit{equal} \quad \lim_{x \to -1^+} f(x)$$

$\lim_{x \to -1^-} 4 - x^2 \overset{\text{must}}{=} \lim_{x \to -1^+} ax^2 - 1$ for $f(x)$ to be continuous

$3 = a - 1$

$4 = a$

check when $x = -1$

$4 - x^2 \overset{?}{=} 4(-1)^2 - 1$

$4 - (-1)^2 \overset{?}{=} 4(1) - 1$

$4 - 1 \overset{?}{=} 4 - 1$

$3 = 3$ ✓