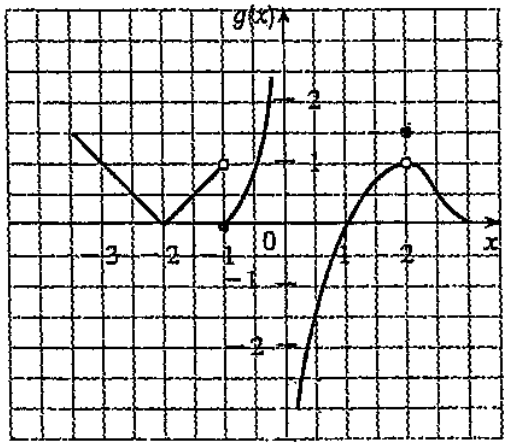
## 4 - TRIG AND ALGEBRAIC LIMITS

1. State the value of the limit, if it exists, from the given graph.

a. $\lim_{x\to 1} g(x)$ b. $\lim_{x\to 0} g(x)$ c. $\lim_{x\to 2} g(x)$

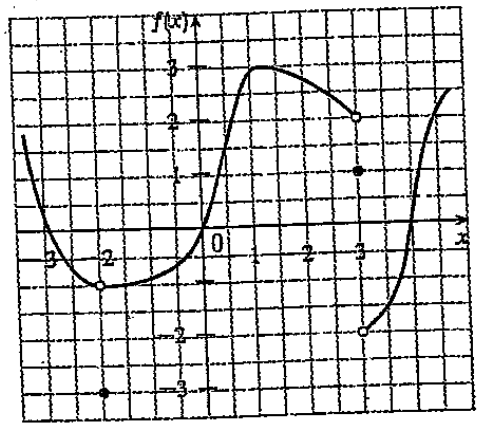
d. $\lim_{x\to -2} g(x)$ e. $\lim_{x\to -1^-} g(x)$ f. $\lim_{x\to -1} g(x)$




2. a. $\lim_{x\to 1} f(x)$ b. $\lim_{x\to 3^-} f(x)$ c. $\lim_{x\to 3^+} f(x)$

d. $\lim_{x\to 3} f(x)$ e. $f(3)$ f. $\lim_{x\to -2^-} f(x)$

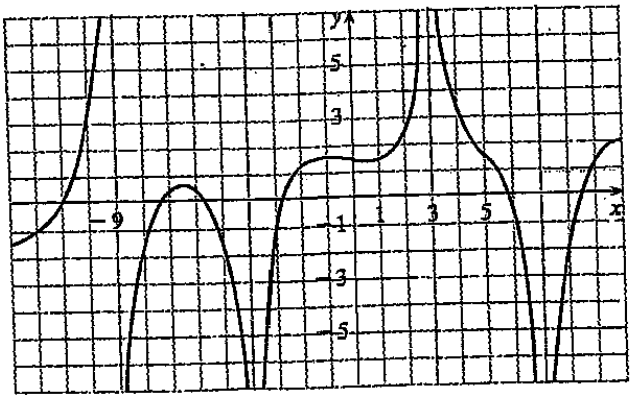
g. $\lim_{x\to -2^+} f(x)$ h. $\lim_{x\to -2} f(x)$ i. $f(-2)$




3. a. $\lim_{x\to 3} f(x)$ b. $\lim_{x\to 7} f(x)$ c. $\lim_{x\to -4} f(x)$

d. $\lim_{x\to -9^-} f(x)$ e. $\lim_{x\to -9^+} f(x)$

f. Write the equation of the vertical asymptotes.




Evaluate each limit. Show work in your notebook.

4. $\lim_{b\to 1} \dfrac{\frac{5b}{b+2}-\frac{5}{3}}{b-1}$

5. $\lim_{x\to 1} \dfrac{x-\sqrt{6x-5}}{x^2-1}$

6. $\lim_{x\to 0} \dfrac{1-\cos x}{4x^2}$

7. $\lim_{x\to 1} \dfrac{\sqrt{3+x}-2}{x^3-1}$

8. $\lim_{x\to -2} \sqrt[3]{\dfrac{4w+3w^3}{3w+10}}$

9. $\lim_{x\to 0} \dfrac{\cot(3x)}{\cot(2x)}$

10. $\lim_{x\to 0} \dfrac{\cos x \sin x}{x}$

11. $\lim_{x\to 2} \dfrac{x-\sqrt{3x-2}}{x^2-4}$

12. $\lim_{x\to 0} \dfrac{\frac{1}{4+x}-\frac{1}{4}}{x}$

13. $\lim_{x\to 0} \dfrac{-3}{x\csc(4x)\cdot\sec(2x)}$

14. $\lim_{x\to 0} \dfrac{(3+h)^{-1}-3^{-1}}{h}$

15. $\lim_{x\to \frac{2}{7}} \dfrac{343x^3-8}{7x-2}$

16. $\lim_{x\to 0} \dfrac{3(1-\cos x)\sec x}{x}$

17. $\lim_{t\to \frac{3}{2}} \dfrac{16t^2-14t-15}{2t-3}$

18. $\lim_{x\to 0} \dfrac{\sec x-1}{x\sec x}$

19. $\lim_{r\to 3} \left(r^4-r-14\right)^{-\frac{2}{3}}$

20. Let $f(x)=\begin{cases}-x^3; x<1\\ (x+2)^2; x\geq 1\end{cases}$

a. $\lim\limits_{x\to 1^+} f(x)$

b. $\lim\limits_{x\to 1^-} f(x)$

c. $\lim\limits_{x\to 1} f(x)$

d. Sketch a graph of f(x)

21. $f(x)=\begin{cases}x;\ x<0\\ x^2;\ 0<x\leq 2\\ 8-x;\ x>2\end{cases}$

a. $\lim\limits_{x\to 0^+} f(x)$

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

c. $\lim\limits_{x\to 1} f(x)$

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

e. $\lim\limits_{x\to 2^+} f(x)$

f. $\lim\limits_{x\to 2} f(x)$

Matching: Match the function with the table.

22. $y_1=\dfrac{x^2+x-2}{x-1}$

23. $y_1=\dfrac{x^2-x-2}{x-1}$

24. $y_1=\dfrac{x^2-2x+1}{x-1}$

25. $y_1=\dfrac{x^2+x-2}{x+1}$

A

| x | y |
|---|---|
| .7 | -.4765 |
| .8 | -.3111 |
| .9 | -.1526 |
| 1 | 0 |
| 1.1 | .1476 |
| 1.2 | .4304 |

B

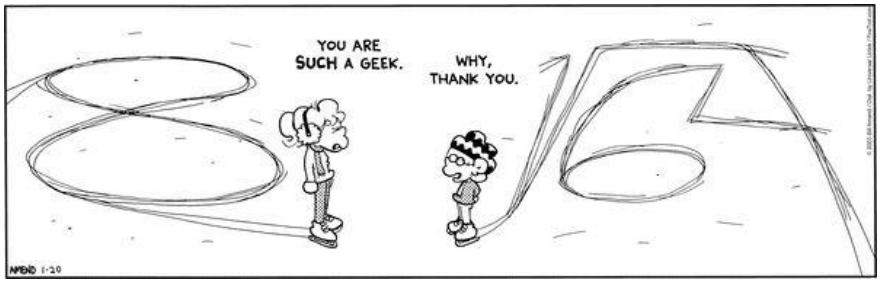
| x | y |
|---|---|
| .7 | 7.367 |
| .8 | 10.8 |
| .9 | 20.9 |
| 1 | ERROR |
| 1.1 | -18.9 |
| 1.2 | -8.8 |

C

| x | y |
|---|---|
| .7 | 2.7 |
| .8 | 2.8 |
| .9 | 2.9 |
| 1 | ERROR |
| 1.1 | 3.1 |
| 1.2 | 3.3 |

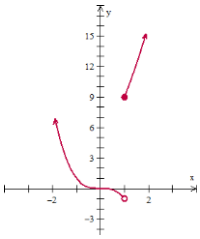
D

| x | y |
|---|---|
| .7 | -.3 |
| .8 | -.2 |
| .9 | -.1 |
| 1 | ERROR |
| 1.1 | .1 |
| 1.2 | .2 |



**ANSWERS**

1. –
    a. 0
    b. DNE
    c. 1
    d. 0
    e. 1
    f. DNE
2. –
    a. 3
    b. 2
    c. -2
    d. DNE
    e. 1
    f. -1
    g. -1
    h. -1
    i. -3
3. –
    a. $\infty$
    b. $-\infty$
    c. $-\infty$
    d. $\infty$
    e. $-\infty$
    f. x=-9, x=-4, x=3, x=7
4. 10/9
5. -1
6. 1/8
7. 1/12
8. -2
9. 2/3
10. 1
11. 1/16
12. -1/16
13. -12
14. -1/9
15. 12
16. 0
17. 17
18. 0
19. 1/16
20. -
    a. -1
    b. 9
    c. DNE
    d. →




21. -
    a. 0
    b. 0
    c. 1
    d. 4
    e. 6
    f. DNE
22. C
23. B
24. D
25. A