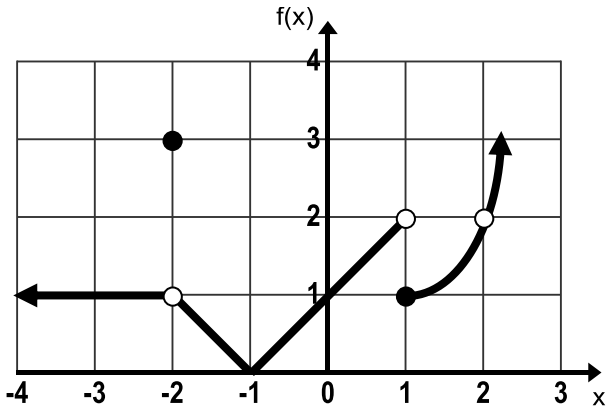
WS- Limits (Graphically)

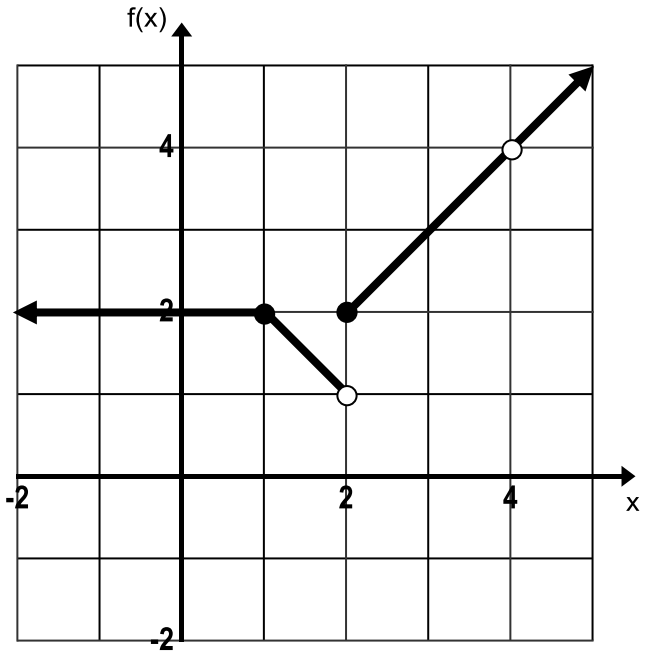


Find the following:

1. a. $\lim_{x\to 0^-} f(x)$ b. $\lim_{x\to 0^+} f(x)$ c. $\lim_{x\to 0} f(x)$
2. a. $\lim_{x\to -1^-} f(x)$ b. $\lim_{x\to -1^+} f(x)$ c. $\lim_{x\to -1} f(x)$
3. a. $\lim_{x\to 1^-} f(x)$ b. $\lim_{x\to 1^+} f(x)$ c. $\lim_{x\to 1} f(x)$
4. a. $\lim_{x\to 2^-} f(x)$ b. $\lim_{x\to 2^+} f(x)$ c. $\lim_{x\to 2} f(x)$
5. a. $\lim_{x\to -2^-} f(x)$ b. $\lim_{x\to -2^+} f(x)$ c. $\lim_{x\to -2} f(x)$
6. a. $\lim_{x\to 0.5^-} f(x)$ b. $\lim_{x\to 0.5^+} f(x)$ c. $\lim_{x\to 0.5} f(x)$
7. a. $\lim_{x\to 0} f(x)$ b. $f(0) =$ c. Is f continuous at $x = 0$?
8. a. $\lim_{x\to -1} f(x)$ b. $f(-1) =$ c. Is f continuous at $x = -1$?
9. a. $\lim_{x\to 1} f(x)$ b. $f(1) =$ c. Is f continuous at $x = 1$?
10. a. $\lim_{x\to 2} f(x)$ b. $f(2) =$ c. Is f continuous at $x = 2$?
11. a. $\lim_{x\to -2} f(x)$ b. $f(-2) =$ c. Is f continuous at $x = -2$?
12. a. $\lim_{x\to 0.5} f(x)$ b. $f(0.5) =$ c. Is f continuous at $x = 0.5$?
13. Function f is discontinuous at which of the following values of x?

-3 -2 -1 0 1 2 3

Math Analysis CP
WS -Piecewise Continuity



1. For function $f(x)$ above:
   a. Locate all points of discontinuity and identify each as a hole or a jump. For each hole, identify the point limit at that location.
   b. Write the piecewise function that created the graph.

For problems 2-7, graph each piecewise function and locate all points of discontinuity.

2. $f(x)=\begin{cases}1+x & \text{if } x<1\\ 5-x & \text{if } x\geq 1\end{cases}$

3. $f(x)=\begin{cases}x^2 & \text{if } x\leq 1\\ 2x & \text{if } x>1\end{cases}$

4. $f(x)=\begin{cases}1+x & \text{if } x\leq 2\\ 5-x & \text{if } x\geq 2\end{cases}$

5. $f(x)=\begin{cases}x^2 & \text{if } x\leq 2\\ 2x & \text{if } x>2\end{cases}$

6. $f(x)=\begin{cases}-x & \text{if } x<0\\ 1 & \text{if } x=0\\ x & \text{if } x>0\end{cases}$

7. $f(x)=\begin{cases}1 & \text{if } x<0\\ 0 & \text{if } x=0\\ 1+x & \text{if } x>0\end{cases}$

Math Analysis CP
WS 15.3- Continuity and End Behavior

Determine whether each function is continuous at the given *x*-value. Justify your answer using the continuity test.

1. $y = \frac{2}{3x^2}; \quad x = -1$

2. $y = \frac{x^2 + x + 4}{2}; \quad x = 1$

3. $y = x^3 - 2x + 2; \quad x = 1$

4. $y = \frac{x - 2}{x + 4}; \quad x = -4$

Describe the end behavior of each function.

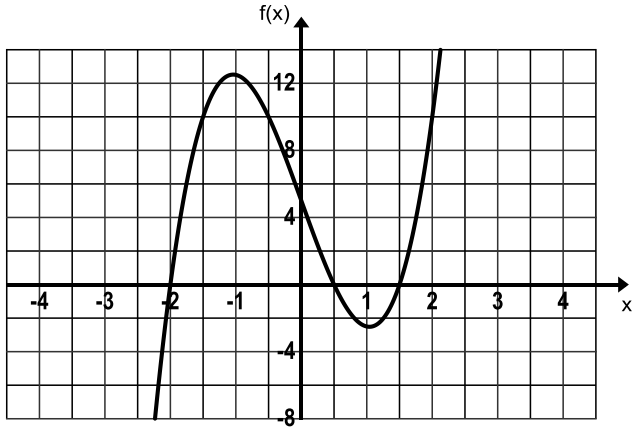
5. $y = 2x^5 - 4x$

6. $y = -2x^6 + 4x^4 - 2x + 1$

7. $y = x^4 - 2x^3 + x$

8. $y = -4x^3 + 5$

9. Given the graph of the function, determine the interval(s) for which the function is increasing and the interval(s) for which the function is decreasing.



Math Analysis CP
WS 15.4- Limits (Algebraic)

Evaluate each limit.

1. $\lim_{x\to 3}\left(x^2+3x-8\right)$

2. $\lim_{x\to -2}\left(2x+7\right)$

3. $\lim_{x\to -6}\dfrac{x^2-36}{x+6}$

4. $\lim_{x\to 3}\dfrac{x^2-5x+6}{x-2}$

5. $\lim_{x\to 2}\dfrac{x-2}{x^2-4}$

6. $\lim_{x\to 3}\dfrac{x^2-9}{x^3-27}$

7. $\lim_{x\to 0}\dfrac{(3+x)^2-9}{x}$

8. $\lim_{x\to 4}\sqrt{x^2-2x+1}$

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

10. $\lim_{x\to 3}\dfrac{x^2-x}{2x^2+5x-7}$

11. $\lim_{n\to\infty}\dfrac{3n-5}{8n}$

12. $\lim_{n\to\infty}\dfrac{n+3}{4n^2}$

13. $\lim_{n\to\infty}\dfrac{2n^2+4n}{5n^2-12}$

14. $\lim_{n\to\infty}\dfrac{5-4n^2}{6n^2+1}$