

Summer 2026 AP Calculus AB

Welcome to AP Calculus! Calculus is all about change, movement, and accumulation.

Calculus is a big step up from Precalculus. The curriculum is full and the pace is fast. To help you start the year successfully, please review the topics below before the year begins. This review is recommended, not mandatory, but doing it will help us start the year running.

This summer work is designed to help you review the first few topics we will study:

- Average rate of change
 - For a function
 - Over an interval
 - Interpreted in context
- Limit notation and finding limits
- Rational functions
 - Finding vertical asymptotes algebraically
 - Finding horizontal asymptotes algebraically
 - Finding slant (oblique) asymptotes algebraically

Attached is a pdf of a Delta Math assignment. The Delta Math time estimate to do this full assignment is 38 minutes, so it should take an hour max to complete.

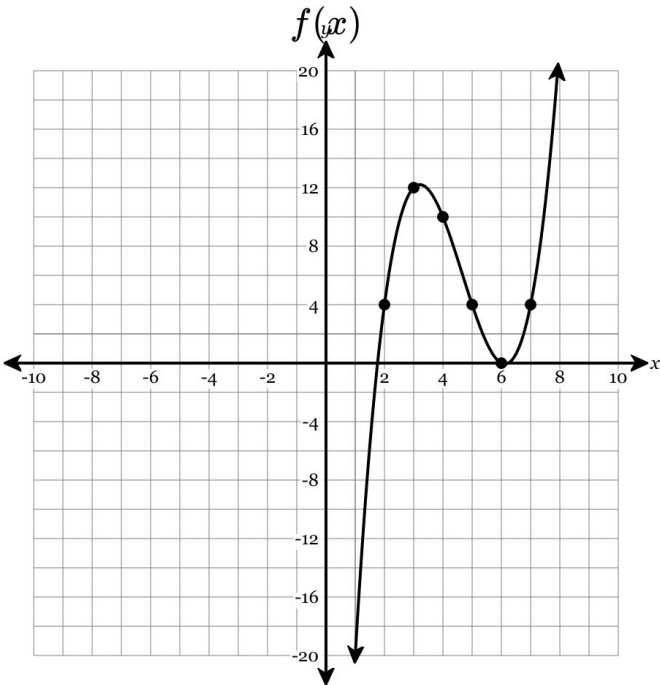
If you need refreshers on any topic, please refer to Khan Academy: www.khanacademy.org or any other source you like.

If you have any questions, email me at coslund@saintjohnsprep.org.

Looking forward to seeing you in August!

Mrs. Oslund

1. The functions $f(x)$, $g(x)$, and $h(x)$ are shown below. Select the option that represents the ordering of the functions according to their average rates of change on the interval $2 \leq x \leq 4$ goes from *least* to *greatest*.

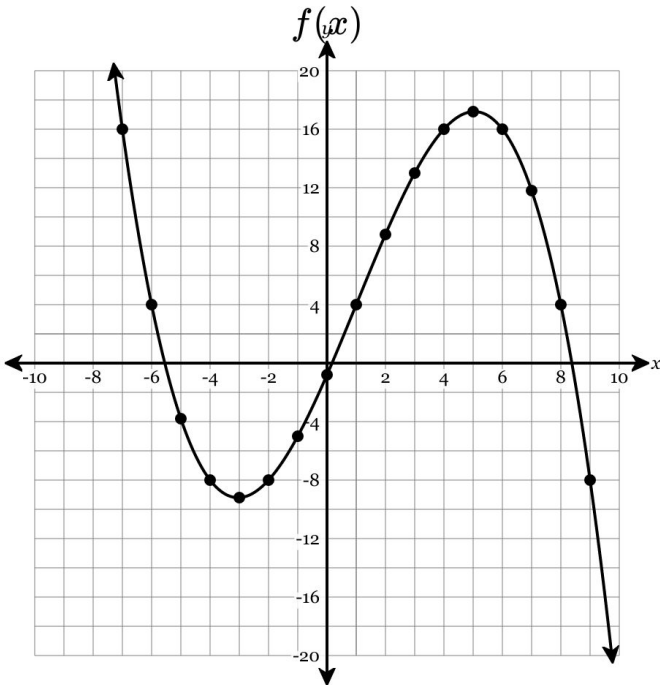


x	$g(x)$
0	10
2	2
4	2
6	10
8	26
10	50

$$h(x) = -x^2 + 10x + 34$$

- A. $g(x)$, $f(x)$, $h(x)$
- B. $f(x)$, $h(x)$, $g(x)$
- C. $g(x)$, $h(x)$, $f(x)$
- D. $h(x)$, $g(x)$, $f(x)$
- E. $h(x)$, $f(x)$, $g(x)$
- F. $f(x)$, $g(x)$, $h(x)$

2. The functions $f(x)$, $g(x)$, and $h(x)$ are shown below. Select the option that represents the ordering of the functions according to their average rates of change on the interval $1 \leq x \leq 9$ goes from *least* to *greatest*.

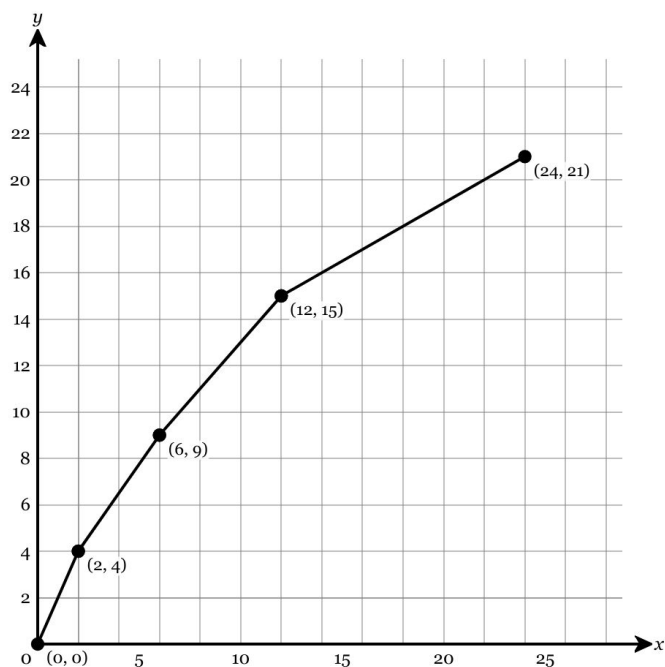


x	$g(x)$
-3	74
1	26
5	10
9	26
13	74

$$h(x) = -x^2 + 2x + 17$$

- A. $h(x)$, $g(x)$, $f(x)$
- B. $f(x)$, $h(x)$, $g(x)$
- C. $g(x)$, $h(x)$, $f(x)$
- D. $g(x)$, $f(x)$, $h(x)$
- E. $f(x)$, $g(x)$, $h(x)$
- F. $h(x)$, $f(x)$, $g(x)$

3. A function is graphed below. On which interval of x is the average rate of change of the function the *greatest*?



- A. $x = 0$ to $x = 2$
- B. $x = 2$ to $x = 6$
- C. $x = 6$ to $x = 12$
- D. $x = 12$ to $x = 24$

4. A function is shown in the table below. On which interval of x is the average rate of change of the function the *smallest*?

x	y
7	6
17	18
41	22
48	27
65	32

- A. $x = 7$ to $x = 17$
- B. $x = 17$ to $x = 41$
- C. $x = 41$ to $x = 48$
- D. $x = 48$ to $x = 65$

5. Find all vertical asymptotes of the following function.

$$f(x) = \frac{x^2 - 49}{3x + 21}$$

6. Find all vertical asymptotes of the following function.

$$f(x) = \frac{4x^2 - 25}{2x^2 - 4x}$$

7. Find all vertical asymptotes of the following function.

$$f(x) = \frac{5x^2 + 9x - 2}{15x - 3}$$

8. Find all horizontal asymptotes of the following function.

$$f(x) = \frac{(x - 7)(x - 6)}{3(x + 9)(x - 6)}$$

9. Find all horizontal asymptotes of the following function.

$$f(x) = \frac{3x^2 - 48}{2x + 8}$$

10. Find all horizontal asymptotes of the following function.

$$f(x) = \frac{(3x - 10)(3x + 10)}{(x - 10)(3x + 10)}$$

11. Find all horizontal asymptotes of the following function.

$$f(x) = \frac{2x + 2}{x^2 - x - 2}$$

12. Determine if the function below has a horizontal or a slant asymptote, and explain why.

$$\frac{4x^2 - 4 + 2x}{2x - 1}$$

The function has a (slant / horizontal) asymptote because the degree of the numerator is (greater than/ equal to/ less than) the degree of the denominator.

Asymptote: _____

13. Determine if the function below has a horizontal or a slant asymptote, and explain why.

$$\frac{-23x^2 - 11 + 12x^3 + 24x}{-4x^2 + 5x - 4}$$

The function has a (slant / horizontal) asymptote because the degree of the numerator is (greater than/ equal to/ less than) the degree of the denominator.

Asymptote: _____

14. Determine if the function below has a horizontal or a slant asymptote, and explain why.

$$\frac{10x^3 + 16x^2 + 11 + 26x}{-2x^2 - 2x - 4}$$

The function has a (slant / horizontal) asymptote because the degree of the numerator is (greater than/ equal to/ less than) the degree of the denominator.

Asymptote: _____

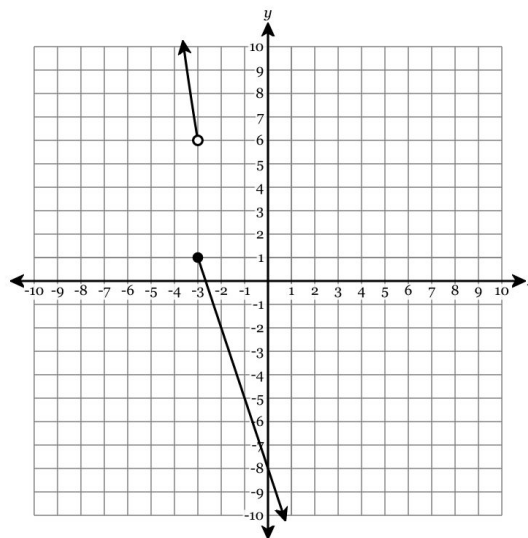
15. Determine if the function below has a horizontal or a slant asymptote, and explain why.

$$\frac{-5x^2 + 5x + 15x^3 + 2}{-1 + x - 3x^2}$$

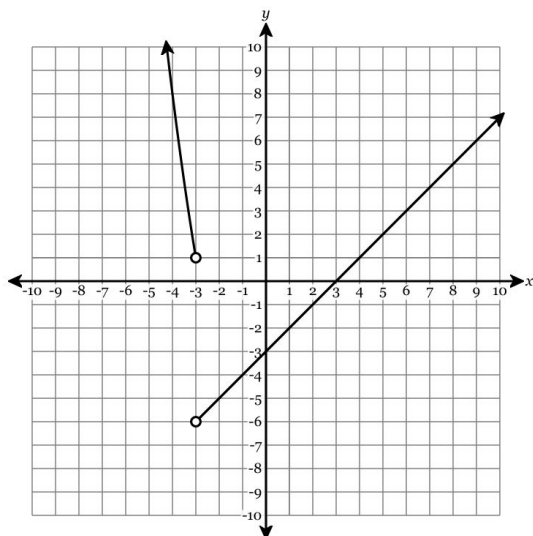
The function has a (slant / horizontal) asymptote because the degree of the numerator is (greater than/ equal to/ less than) the degree of the denominator.

Asymptote: _____

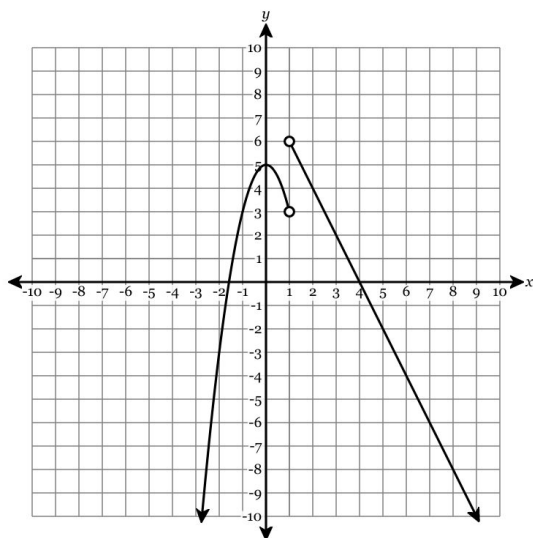
16. For the function $f(x)$ shown below, determine $\lim_{x \rightarrow -3^+} f(x)$.



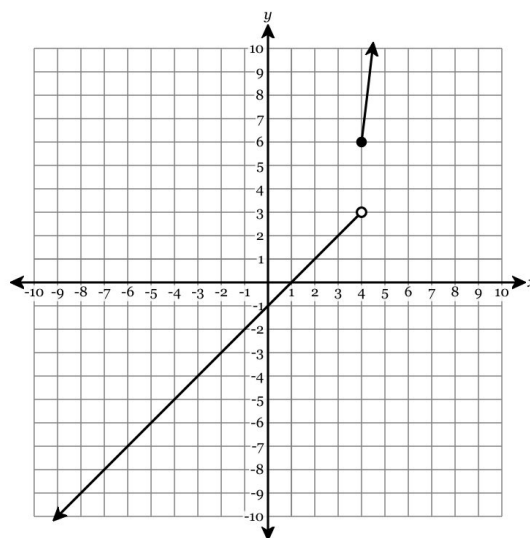
17. For the function $f(x)$ shown below, determine $f(-3)$.



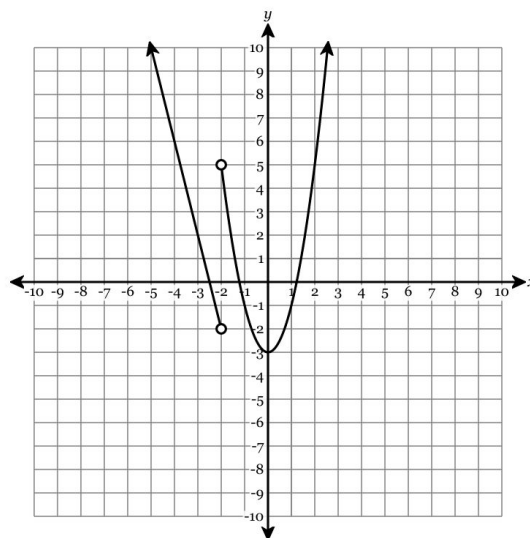
18. For the function $f(x)$ shown below, determine $\lim_{x \rightarrow 1^-} f(x)$.



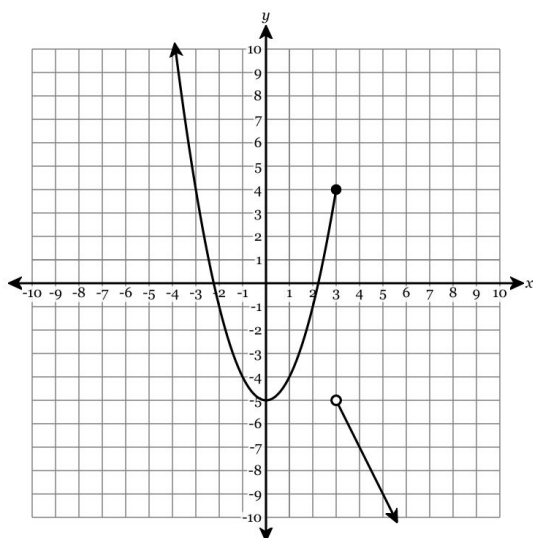
19. For the function $f(x)$ shown below, determine $\lim_{x \rightarrow 4^+} f(x)$.



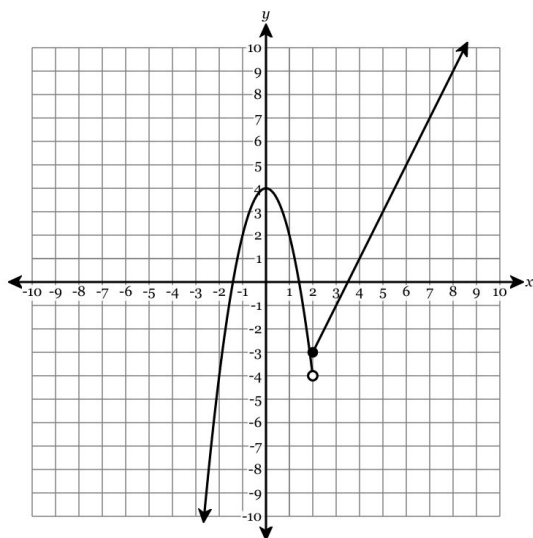
20. For the function $f(x)$ shown below, determine $\lim_{x \rightarrow -2^+} f(x)$.



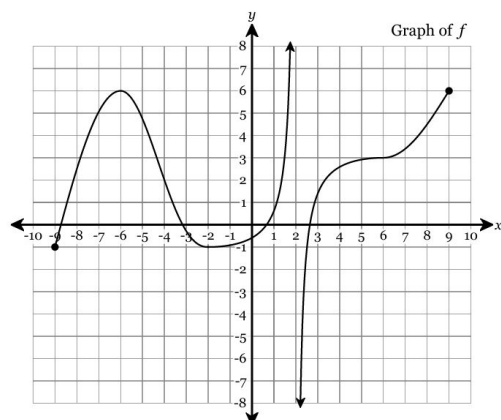
21. For the function $f(x)$ shown below, determine $f(3)$.



22. For the function $f(x)$ shown below, determine $\lim_{x \rightarrow 2^-} f(x)$.

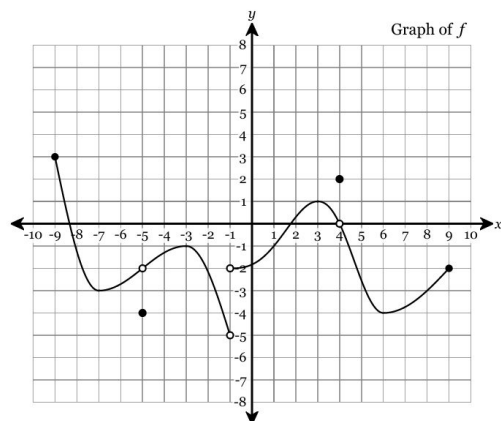


23. Answer all of the questions below about the function $f(x)$ graphed below when $x = 2$. Write dne and undefined to reference values that do not exist or are undefined.



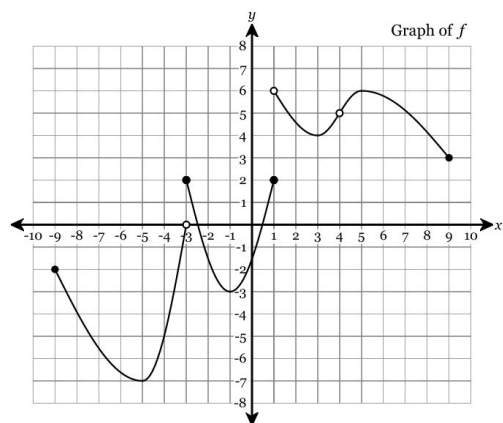
$$\begin{array}{ll} \lim_{x \rightarrow 2^-} f(x) = \underline{\hspace{2cm}} & \lim_{x \rightarrow 2^+} f(x) = \underline{\hspace{2cm}} \\ \lim_{x \rightarrow 2} f(x) = \underline{\hspace{2cm}} & f(2) = \underline{\hspace{2cm}} \end{array}$$

24. Answer all of the questions below about the function $f(x)$ graphed below when $x = 4$. Write dne and undefined to reference values that do not exist or are undefined.



$$\begin{array}{ll} \lim_{x \rightarrow 4^-} f(x) = \underline{\hspace{2cm}} & \lim_{x \rightarrow 4^+} f(x) = \underline{\hspace{2cm}} \\ \lim_{x \rightarrow 4} f(x) = \underline{\hspace{2cm}} & f(4) = \underline{\hspace{2cm}} \end{array}$$

25. Answer all of the questions below about the function $f(x)$ graphed below when $x = -5$. Write dne and undefined to reference values that do not exist or are undefined.



$$\lim_{x \rightarrow -5^-} f(x) = \underline{\hspace{2cm}} \quad \lim_{x \rightarrow -5^+} f(x) = \underline{\hspace{2cm}}$$

$$\lim_{x \rightarrow -5} f(x) = \underline{\hspace{2cm}} \quad f(-5) = \underline{\hspace{2cm}}$$