

AP Calculus AB Summer Assignment

All questions should be completed without any AI assistance.
If you have questions, please email me at tjewell@canterburyfortmyers.org.

Due Date: First Day of Class

I attest that everything in this packet has been done honestly in accordance with the Canterbury School

Honor Code: _____

What is Calculus?

Please do some brief online research and write a paragraph on what calculus is, what it is used for, and what we will be studying this year. Use the words “limit,” “derivative,” “integral,” “infinitesimal,” and “instantaneous.” Write your response below:

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

1. For each of the following functions, first complete the table and then, based on the table, find the given limits. If a limit does not exist, write "DNE".

↑ use a calculator

(a) $f(x) = \frac{x^2 - x - 6}{x - 3}$

x	2.9	2.99	2.999	2.9999	3.1	3.01	3.001	3.0001
$f(x)$								

$$\lim_{x \rightarrow 3^-} f(x) =$$

$$\lim_{x \rightarrow 3^+} f(x) =$$

$$\lim_{x \rightarrow 3} f(x) =$$

(b) $f(x) = \frac{|x - 3|}{x - 3}$

x	2.9	2.99	2.999	2.9999	3.1	3.01	3.001	3.0001
$f(x)$								

$$\lim_{x \rightarrow 3^-} f(x) =$$

$$\lim_{x \rightarrow 3^+} f(x) =$$

$$\lim_{x \rightarrow 3} f(x) =$$

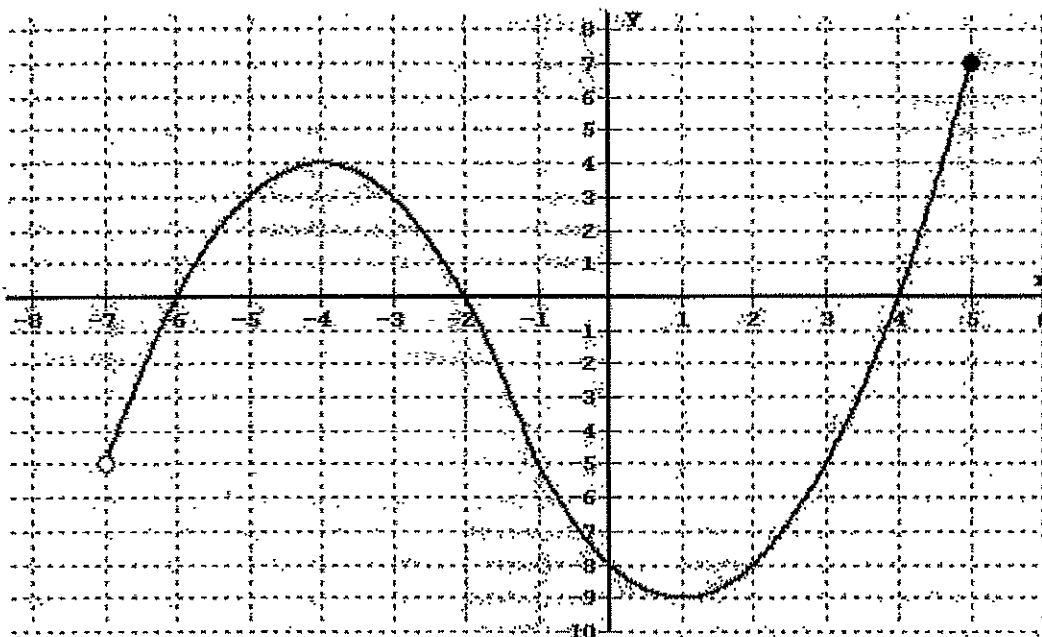
(c) $f(x) = \frac{1}{x^2}$

x	-0.1	-0.01	-0.001	-0.0001	0.1	0.01	0.001	0.0001
$f(x)$								

$$\lim_{x \rightarrow 0^-} f(x) =$$

$$\lim_{x \rightarrow 0^+} f(x) =$$

$$\lim_{x \rightarrow 0} f(x) =$$

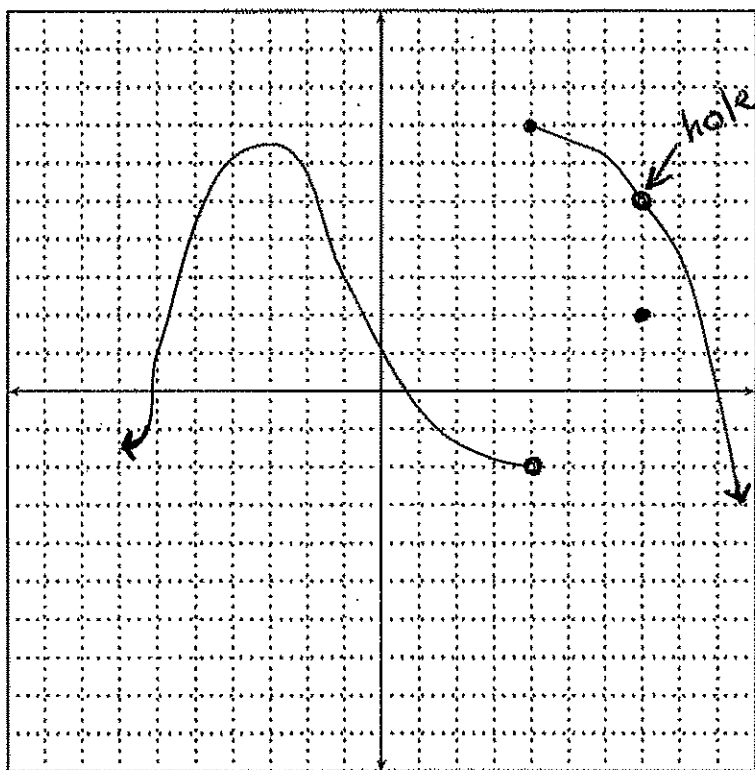


Use the graph to find each.

1. x-intercept(s):
2. y-intercept(s):
3. Is this a function?
4. Domain:
5. Range:
6. Where is $f(x) < 0$?
List the x-values, interval notation.
7. Where is $f(x) \geq 0$?
List the x-values, interval notation.
8. Find $f(2)$.
9. Find $f(-5)$.
10. State the graph's boundedness:
11. How many times does the line $y = 2$ intersect the graph?
12. Is the graph even, odd, or neither?
13. Where does $f(x) = 4$?
14. Where does $f(x) = -5$?
15. Find $f(-1) - f(2)$.
16. Find $3f(1)$.
17. Absolute Maximum value:
18. Absolute Minimum value:
19. Relative Maximum value:
20. Relative Minimum value:
21. Where is the graph increasing?
State the x-values, interval notation.
22. Where is the graph decreasing?
State the x-values, interval notation.

y-values

2. Use the following graph to find each of the following. If a limit does not exist, write "DNE".



(a) $f(-1)$

(c) $\lim_{x \rightarrow 4^+} f(x)$

(e) $f(7)$

(b) $\lim_{x \rightarrow 4^-} f(x)$

(d) $\lim_{x \rightarrow 4} f(x)$

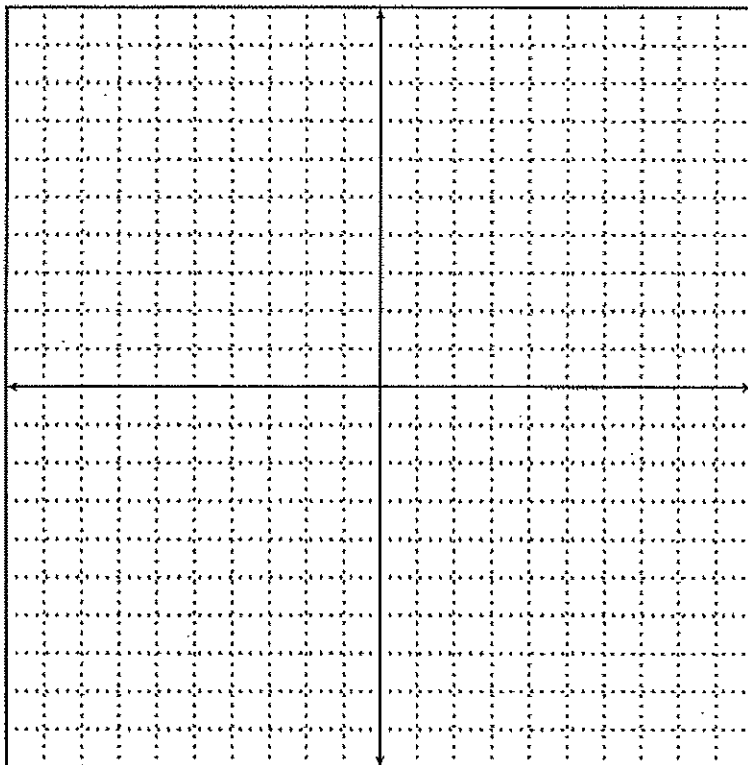
(f) $\lim_{x \rightarrow 7} f(x)$

No calculator

3. Let f be the function defined by $f(x) = \begin{cases} -x + 3 & \text{if } x < 2 \\ 3 & \text{if } x = 2 \\ -x^2 + 6x - 3 & \text{if } x > 2 \end{cases}$

↑ domain restrictions

(a) Sketch the graph of f .



(b) For each of the following, find the limit if it exists. If the limit does not exist, write "DNE".

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

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

$$\lim_{x \rightarrow 2} f(x)$$

★ show all work. don't divide by trig functions ★

Solve each equation over $[0, 2\pi)$ by factoring. All answers must be exact in terms of π .

13] $\sin^2 x - 3 \sin x + 2 = 0$

17] $\cot^2 x = -2 \cot x - 1$

14] $\sin^2 x \cos x = \cos x$

18] $\sin x - 2 \sin x \cos x = 0$

15] $2 \cos^2 x - \sqrt{3} \cos x = 0$

19] $\sec x \csc x = 2 \csc x$

16] $2 \sin^2 x + \sin x = 1$

20] $\tan x \csc x - 2 \tan x = 0$

solve for x:
no calculators

19.) $\log_8 2 + \log_8(4x^2) = 1$

20.) $\log_9(x+6) - \log_9 x = \log_9 2$

21.) $\log_6(x+1) - \log_6 x = \log_6 29$

22.) $\log_5 6 + \log_5(2x^2) = \log_5 48$

23.) $\ln(4x-1) = 3$

24.) $\ln(3x+11) = 4$

Hints:

LBAE

addition $\leftrightarrow$ multiplication

subtraction $\leftrightarrow$ division

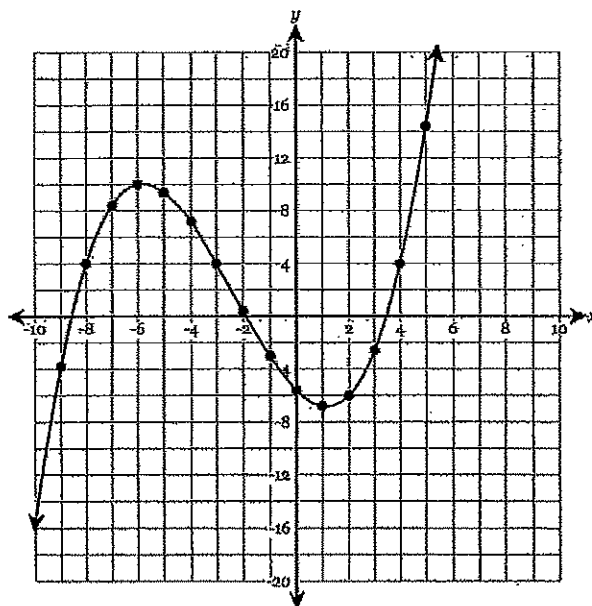
$\ln() = \log_e()$

1. Given the function defined in the table below, find the average rate of change, in simplest form, of the function over the interval $5 \leq x \leq 50$.

x	5	20	35	50	65
$f(x)$	6	9	12	15	18

2. Given the function $h(x) = x^2 - 3x - 1$, determine the average rate of change of the function over the interval $-2 \leq x \leq 4$.

3. The function $y = f(x)$ is graphed below. What is the average rate of change of the function $f(x)$ on the interval $-8 \leq x \leq 2$?



$$\star \text{ARC} = \text{slope} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

4. For each of these functions, find and simplify the *difference quotient*. For a function f , the difference quotient of f is $\frac{f(x+h)-f(x)}{h}$.

a) $f(x) = 4x + 3$

b) $g(x) = x^2 - 4$

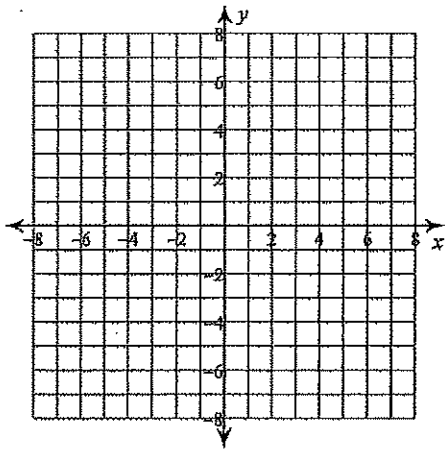
c) $h(x) = 2x^2 - 3x + 1$

d) $k(x) = \frac{1}{x+3}$

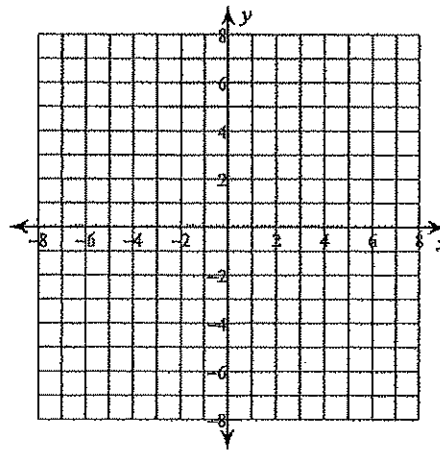
★ BOBØ, BONN, BONBOS, EDROC ★

Graph each function without a calculator. Show all holes and asymptotes.

1) $f(x) = \frac{x^3 - 3x^2 - 4x}{4x^2 - 8x}$



2) $f(x) = \frac{-x^2 - 2x + 8}{x^2 + 5x + 4}$



The last (and largest) section of the summer assignment is a DeltaMath. Please join the class on deltamath.com using the teacher code **679440** and the class code **RW99-5H53** if needed.

There is an assignment called "APCAB Summer Assignment." Complete this honestly. I will be checking for potential cheating. This is due before the first day of school.

This is a VERY length assignment, so please do not procrastinate.