

## Summer Work and List of Topical Understandings

For students to successfully complete the objectives of the AB Calculus curriculum, the student must demonstrate a high level of independence, capability, dedication, and effort. This summer packet will help you maintain/improve your skills. This packet is a **requirement** for those entering the AB Calculus course and is due on the first day of class. Complete as much of this packet on your own as you can, then get together with a friend, e-mail me, or “google” the topic. **SHOW YOUR BEST WORK.**

Requirements:

---

*The following are guidelines for completing the summer work packet...*

- ✓ There are 50 questions you must complete. You must show all of your work on the packet.
  - ✓ Be sure all your solutions are neat and organized, and all writing is legible.
  - ✓ The majority of the questions are **CALCULATOR INACTIVE (CI)**. You are expected to be able to handle basic and intermediate computation.
  - ✓ For the few questions which are **CALCULATOR ACTIVE (CA)**, you must be familiar with certain built-in calculator functions such as finding values, intersection points, using tables, and zeros of a function.
  - ✓ I expect you to come in with certain understandings that are prerequisite to Calculus. A list of these topical understandings is below.
- 

### **Topical understandings within summer work...**

- ❖ Factoring
- ❖ Zeros/roots/x-intercepts of rational and polynomial functions
- ❖ Completing the square
- ❖ Write the equation of a line
- ❖ Quadratic formula
- ❖ Unit Circle
- ❖ Composite function and notation
- ❖ Solving trigonometric equations
- ❖ Domain/Range
- ❖ Interpreting and comprehending word problems
- ❖ Solving In equations
- ❖ Graphing, simplifying expressions, and solving equations of the following types: trigonometric, rational, piecewise, logarithmic, exponential, polynomial/power, and radical.

Finally, I suggest not waiting until the last two weeks of summer to begin on this packet. If you spread it out, you will most likely retain the information much better. Once again this is due, completed with quality, on the first day of class. It is your ticket into the class. Best of luck, and if you have any questions, feel free to contact us at [mllorin@bcps.org](mailto:mllorin@bcps.org).

Mrs. Llorin

Calculus AB/BC Summer Review Packet 2019

*(CI) Simplify using only positive exponents in your final answer.*

1.  $-3^{-x}$

2.  $\frac{9x^2}{\sqrt{x}}$

3.  $\left(\frac{4}{x^2}\right)^{-3}$

4.  $(16x^2y)^{3/4}$

5.  $-5\left(\frac{3}{2}\right)(4-9x)^{-1/2}(-9)$

6.  $(4xy^{-3})(.5)^2$

7.  $\frac{\sqrt{4x-16}}{\sqrt[4]{(x-4)^3}}$

8.  $\frac{4^{x+3}}{4^{2x}}$

*(CI) Factor completely.*

9.  $x^5 + 11x^3 - 80x$

10.  $(x-3)^2(2x+1)^3 + (x-3)^3(2x+1)^2$

*(CI) Solve the following inequalities by factoring and making sign charts.*

11.  $x^2 - 16 > 0$

12.  $x^2 - 3x \leq 10$

Calculus AB/BC Summer Review Packet 2019

*(CI) Describe, in words, the transformations that would take place to  $f(x)$  in each of the following.*

13.  $f(x)-4$

14.  $f(x-4)$

15.  $-f(x+2)$

16.  $5f(x)+3$

17.  $f(2x)$

18.  $|f(x)|$

*(CI and CA) Solve each equation algebraically. Check your answer with the graphing calculator by “solving graphically.”*

19.  $7x^2 - 3x = 0$

20.  $4x(x-2) - 5x(x-1) = 2$

21.  $2x^2 - 3x + 3 = 0$

22.  $2\log_5 x + 1 = 5$

23.  $x + \frac{1}{x} = \frac{13}{6}$

24.  $x - 10\sqrt{x} + 9 = 0$

Calculus AB/BC Summer Review Packet 2019

25.  $4 = e^{2x-1}$

26.  $1 = \log(x + 6) - \log(x + 2)$

**(CI) Find the equations of all vertical ( $x = ?$ ) and horizontal ( $y = ?$ ) asymptotes (if they exist).**

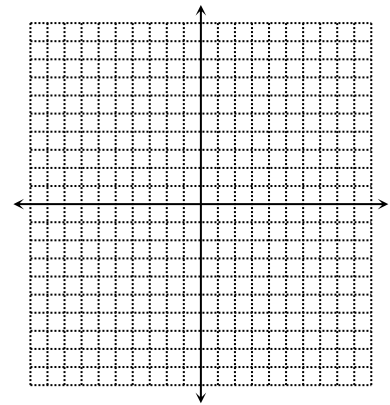
27.  $y = \frac{x+4}{x^2-1}$

28.  $y = \frac{x^2-9}{x^3+3x^2-18x}$

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

**(CI) Graph an accurate sketch of the following rational function. Identify the asymptotes, zeros,  $y$  - intercept, holes, and end behavior**

30.  $f(x) = \frac{2x+1}{x^2+6x+8}$



**(CI) Simplify the following.**

31.  $\frac{x}{x - \frac{1}{2}}$

32.  $\frac{1}{x+2} + \frac{1}{2x}$

Calculus AB/BC Summer Review Packet 2019

(CI) If  $f(x) = x^2$ ,  $g(x) = 2x - 1$ , and  $h(x) = 2^x$ , write an expression for the following.

33.  $f(g(2))$

34.  $g(f(2))$

35.  $f(h(-1))$

36. (CI) Evaluate the following from memory.

a)  $\sin\left(\frac{7\pi}{6}\right)$

b)  $\csc(60^\circ)$

c)  $\cos(120^\circ)$

d)  $\sin\frac{\pi}{2}$

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

f)  $\cos 0$

g)  $\sin 2\pi$

(CI) Solve each equation on the interval  $[0, 2\pi)$ . Give exact values (ex:  $\frac{\pi}{3}$ ) if possible.

37.  $\sin x = \frac{1}{2}$

38.  $\cos^2 x = \cos x$

39.  $\sin(6x) = -1$

40.  $2\sin^2 x + \sin x = 1$

Calculus AB/BC Summer Review Packet 2019

(CI) Answer the following questions over a variety of topics.

41. Find an equation for the line, in point-slope form, that contains  $(5,1)$  and is perpendicular to  $6x - 3y = 2$ .

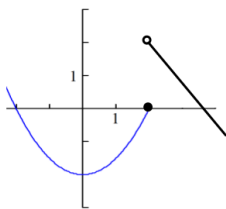
42. Use the table to calculate the **average rate of change** from  $t = 1$  to  $t = 4$ .

$t$	0	1	2	3	4
$x(t)$	8	7	5	1	2

43. If  $g(x) = \frac{x}{x+3}$ , find  $g^{-1}(x)$  (the inverse of  $g$ ).

44. Algebraically, find the points of intersection in the graphs of  $y = x - 1$  and  $y^2 = 2x + 6$

45. The function  $f(x)$  is graphed below. Find the following.



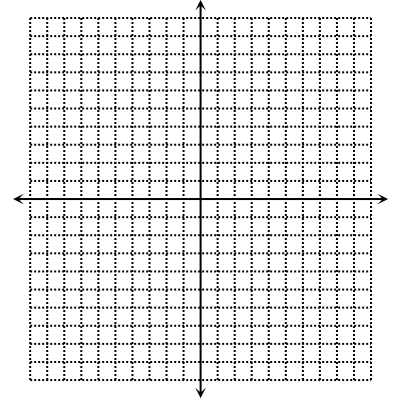
a)  $f(2)$

b)  $f(0)$

c) If  $f(x) = 0$   $x = \underline{\hspace{2cm}}$

46. Rewrite  $\frac{1}{2}\ln(x-3) + \ln(x+2) - 6\ln x$  as a single logarithmic expression.

47. Sketch a graph of the piecewise function  $f(x) = \begin{cases} x^2 - 5, & x < -1 \\ 0, & x = -1 \\ 6 - 4x, & x > -1 \end{cases}$ .



*(CA) Answer the following questions over a variety of topics.*

48. The number of elk after  $t$  years in a state park is modeled by the function  $P(t) = \frac{1216}{1 + 75e^{-0.03t}}$ .

- What was the initial population?
- Solve graphically to find when the number of elk will be 750.
- What is the maximum number of elk possible in the park?

49. Use a graphing calculator to solve  $e^{2x} = 3x^2$ .

50. What is the value of  $\left(1 + \frac{1}{x}\right)^x$  as  $x$  gets very, very large?