

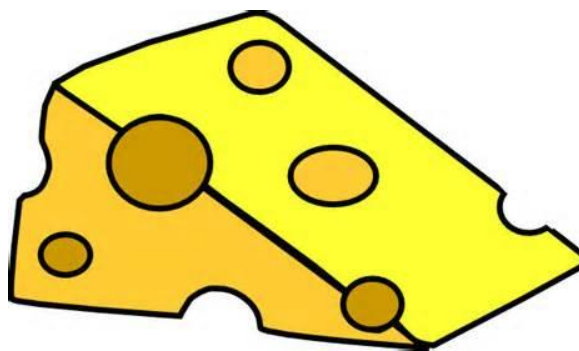
# Advanced Placement Calculus BC Summer Packet

The purpose of these tasks is to review several topics from PreCalculus. Your participation in this work is required, and an organized final copy of your work is expected to be submitted on the first day of school.

WRITE ALL ANSWERS AND WORK ON THE ANSWER SHEETS PROVIDED!!!!

Name:

Date:



**Picture a block of Swiss Cheese.....**

It is filled with holes and yet it stays in one piece. But this block of cheese has to be cut into slices. **If there are too many holes, the slices will simply fall apart.**

**So, it is with Calculus.** The AP Calculus course you are about to take is based on your foundation in mathematics – all the math that you have ever learned will come into play in this course. Since you are taking calculus, it is possible that some of that material you knew fairly well at one time, but unfortunately, without everyday use, you just plain forget it. It is also possible that you never really learned it at all???

Calculus is hard enough and if you lose points on a problem, you want it to be because you had a conceptual issue with the calculus topic, not because your knowledge of precalculus/algebra was faulty.

So, I will address the Precalculus topics that you should be **VERY** comfortable with before beginning Calculus. If you are not extremely comfortable with the following topics, you need to put in the time and become extremely comfortable with them. It will be worth your time and you will be happy you did it now and not when you need to apply that concept.

Precalculus Topics: There are 2 questions for each topic – complete each of them completely and show all work on the answer sheet.

Functions –

1) If  $V(r) = \frac{4}{3}\pi r^3$ , find  $\frac{V(2r)}{V(r)}$ .

2) If  $f(x) = \begin{cases} \sqrt{x+2} - 2, & x \geq 2 \\ x^2 - 1, & 0 \leq x < 2 \\ -x, & x < 0 \end{cases}$ , find  $f(0) - f(2)$

Domain and Range –

Find (without graphing) the domain of the following functions using interval notation:

3)  $f(x) = \frac{x-4}{x^2-16}$       4)  $y = \frac{\sqrt{5-x}}{\log x}$

Graphs of Common Functions – **(Extremely Important)** –

Know graphs of : (domain, range, and shape of graph)

a)  $f(x) = a$ , where  $a$  is a constant

b)  $f(x) = x$

c)  $f(x) = x^2$

d)  $f(x) = x^3$

e)  $f(x) = \sqrt{x}$

f)  $y = |x|$

g)  $y = \frac{1}{x}$

h)  $y = \ln x$

i)  $y = e^x$

j)  $f(x) = e^{-x}$

k)  $y = \sin x$

l)  $y = \cos x$

It is **Super Important** that you can graph these parent functions with ease – so that we can build off of those graphs.

Even and Odd Functions –

Determine if the following functions are even, odd, or neither. (Algebraically)

5)  $f(x) = \sqrt{x+1}$       6)  $f(x) = -3x^3 - 2x$

Transformations of Graphs –

Sketch the following equations on the answer sheet: (Without a calculator)

7)  $y = 2^x - 2$       8)  $y = \frac{1}{(x+2)^2} - 3$

Factorizations – Really important to be able to FACTOR!!!!

Completely factor the following expressions:

9)  $3x^8 - 3$       10)  $x^6 - 9x^4 - 81x^2 + 729$

### Linear Functions –

11) Write equations of the line through the given point a) parallel and b) normal to the given line:  $(-6, 2), 5x + 2y = 7$

12) Find  $k$  if the lines  $3x - 5y = 9$  and  $2x + ky = 11$  are parallel.

### Solving Quadratic Equations –

Solve for  $x$ :

13)  $x + \frac{1}{x} = \frac{17}{4}$

14) If  $y = x^2 + kx - k$ , for what value(s) of  $k$  will the quadratic have two real solutions?

### Asymptotes –

Find any vertical and horizontal asymptotes and if present, the location of holes, for the graphs of:

15)  $y = \frac{5x+1}{x^2-x-1}$

16)  $y = \frac{x^3}{x^2+4}$

### Negative and Fractional Exponents –

Simplify completely and write with positive exponents:

17)  $-12^2 x^{-5}$

18)  $\frac{(x^2-1)^{-1/2}}{(x^2+1)^{1/2}}$

### Eliminating Complex Fractions –

Eliminate the complex fractions:

19)  $\frac{x - \frac{1}{x}}{x + \frac{1}{x}}$

20)  $\frac{x^{-2} + x^{-1} + 1}{x^{-2} - x}$

### Inverses –

Find the inverse of the following functions:

21)  $y = \frac{2x+1}{3-2x}$

22) Without finding the inverse, find the domain and range of the inverse to  $f(x) = \frac{\sqrt{x+2}}{x^2}$

### Adding Fractions and Solving Fractional Equations –

23) Solve:  $\frac{1}{x-3} + \frac{1}{x+3} = \frac{10}{x^2-9}$

24) Solve:  $\frac{2x-1}{x-1} - \frac{3x}{2x+1} = \frac{x^2+11}{2x^2-x-1}$

Solving Absolute Value Equations –

Solve the following equations:

25)  $|4x - 5| + 5x + 2 = 0$

26)  $|12 - x| = x^2 - 12x$

Solving Inequalities –

Solve the following inequalities:

27)  $5(x - 3) \leq 8(x + 5)$

28)  $\frac{5}{x-6} \geq \frac{1}{x+2}$

Exponential Functions and Logarithms – WITHOUT A CALCULATOR!

29) Find:  $\log_{12}2 + \log_{12}9 + \log_{12}8$

30) Solve:  $\log_5(3x - 5) = 2$

Right Angle Trigonometry –

31)  $\cot \theta = \frac{-2\sqrt{10}}{3}$ , find  $\sin \theta$  and  $\cos \theta$ .

32) Find the quadrant(s) where the following is true:  $\sin \theta > 0$  and  $\cos \theta < 0$ .

Special Angles –

33) Evaluate the following without a calculator:  $\left(\cos \frac{2\pi}{3} - \tan \frac{3\pi}{4}\right)^2$

34) Determine whether the following statement is true or false: (w/o a calculator)

$$\sin \frac{\pi}{6} + \sin \frac{\pi}{3} = \sin\left(\frac{\pi}{6} + \frac{\pi}{3}\right)$$

Trigonometric Identities –

Verify the following identities:

35)  $\frac{1}{1+\tan x} + \frac{1}{1+\cot x} = 1$

36)  $\frac{\cos x - \cos y}{\sin x + \sin y} + \frac{\sin x - \sin y}{\cos x + \cos y} = 0$

Solving Trig Equations and Inequalities –

Solve for  $x$  on  $[0, 2\pi)$ :

37)  $\sin^3 x = \sin x$

38)  $2\cos^2 x + \sin x - 1 = 0$

Graphical Solutions to Equations and Inequalities –

Solve these equations or inequalities graphically:

39)  $2x^2 - 1 = 2^x$

40)  $2 \ln(x + 1) = 5 \cos x$  on  $[0, 2\pi)$

**Answer sheet for AP Calculus BC Summer Packet** – this is what you will be handing in on first day of school!  
If you need more space, use scrap paper then organize your final version of your work in the space provided!!!!

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

Precalculus Topics

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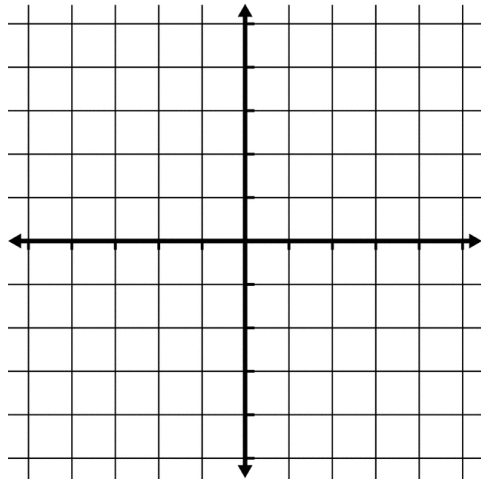
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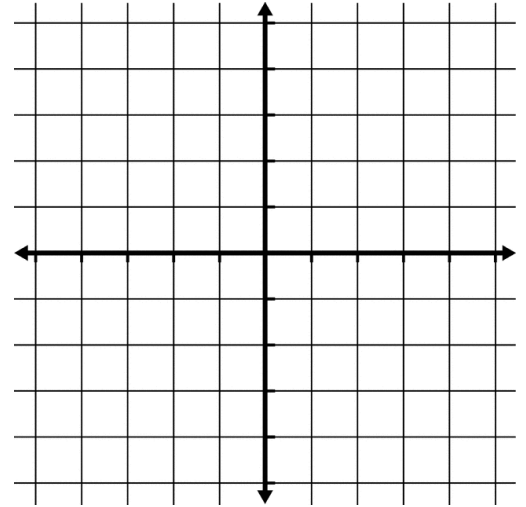
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