

# AP Calculus AB Summer Assignment

Dear AP Student,

Welcome to AP Calculus! We are really looking forward to the upcoming school year. Calculus is an exciting and challenging course that we hope you will enjoy. In order for us to start off right in September, I need you to do a little work this summer. Please complete the following problems and turn them in on the first day of class. This will be a QUIZ grade. Have a wonderful summer. We will see you in September!

Mr. Burnap & Ms. Schwzers

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Your summer assignment consists of three parts. The first piece are the Twenty Best Friends graph assignment below. The second portion is a review of  $e$  and  $\ln$ . Third is a review of the Unit Circle and Trigonometry. You will find the information from this review helpful throughout the school year. Neatness does count! If I can't read your work then you get no credit (the same is true on the AP test).  
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## Part I: Twenty Best Friends

For each of the following twenty graphs you must complete the following. Knowing this information will be extremely helpful throughout the school year. You should know the general shape of each of these graphs from the equation alone.

1. Sketch the graph (you may use a calculator to help you but you must put the sketch on paper). **1 point**
2. State the domain and range in interval notation. Explain the limitations on domain and range (division by zero, imaginary numbers, absolute value, even exponents, or no limitation).
3. State whether the function is even, odd, or neither.
4. State the roots of the function or state that there are no roots.
5. State the  $y$ -intercepts or state that there are no  $y$ -intercepts.

1. $y = x$	5. $y = \frac{ x }{x}$	9. $y = \frac{\ln x}{x}$	13. $y = \cos x$	17. $y = -\sqrt{9 - x^2}$
2. $y = x^2$	6. $y = e^x$	10. $y = \frac{1}{x}$	14. $y = \tan x$	18. $y = (x+1)^2 - 3$
3. $y = x^3$	7. $y = \frac{e^x}{x}$	11. $y = x^x$	15. $y = \frac{1}{x+2}$	19. $y = \sqrt{x+3}$
4. $y =  x $	8. $y = \ln x$	12. $y = \sin x$	16. $y = \sqrt{9 - x^2}$	20. $y = -\sqrt{x+3}$

Part II: Review of e and ln.

In each equation, solve for x (without using a calculator). Show all possible work:

1.  $5^{(x+1)} = 25$

2.  $\frac{1}{3} = 3^{2x+2}$

3.  $\log_2 x = 3$

4.  $\log_3 x^2 = 2\log_3 4 - 4\log_3 5$

Simplify each expression:

5.  $\ln 5 + \ln(x^2 - 1) - \ln(x - 1)$

6.  $2\ln_4 9 - \ln_2 3$

7.  $3^{2\log_3 5}$

8.  $\log_{10} \left( 10^{\frac{1}{2}} \right)$

9.  $\log_{10} \left( \frac{1}{10^x} \right)$

10.  $2\ln \sqrt{x} + 3\ln x^{\frac{1}{3}}$

Part III. Answer the following questions using the Unit Circle or your knowledge of Trigonometry.

Find the value of:

1.  $\sin(\pi/2)$
2.  $\cot(\pi/6)$
3.  $\csc(3\pi/4)$
4.  $\sec(7\pi/6)$
5.  $\cos(\pi)$
6.  $\tan(\pi/2)$

Solve for  $x$  on the interval  $0$  to  $2\pi$ :

7.  $\cos x + \sin^2 x + \cos^2 x = 1/2$
8.  $\sin(2x) = 1/2$
9.  $\sin x \sec x = 1$
10.  $\cos x \sec x + \sin x = 1/2$