AP Calculus AB – Summer Assignment

Congratulations on choosing to take AP Calc and AP Physics next year. Me (Mr. Godack) and Mr. Withers are excited to work with you in this course. However, in order to participate in the program next year, you MUST complete all of the summer assignments by the first day of school this fall. You may wish to start this later in the summer so you are fresh when school starts, but do not wait until the week before. This will take a little bit of time so judge accordingly.

This is a multi-part assignment. Make sure you also have the AP Physics packet as well. The packets are due on the first day of class this fall and we encourage you to work together!!

We first need you to complete a quick survey at this site as soon as possible. https://tinyurl.com/yczldfhx

If you have any questions, please email Mr. Godack or Mr. Withers over the summer. We highly encourage you to work with other people in the class and past AP students as well. If you do not know or remember how to do a problem, use the internet and other students as help. Blank answers will not be accepted. We expect that all parts of the assignment will be completed or at least attempted.

Below are instructions for AP Calculus. Remember, you also need the AP Physics packet.

1. The problems in this packet are designed to help you review topics from previous mathematics courses that are important to your success in AP Calculus AB. **DO ALL PROBLEMS WITHOUT A CALCULATOR UNLESS IT SPECIFIES TO USE ONE**. Show all work that leads you to each solution on separate sheets of paper. You may use ***your*** notes from previous mathematics courses to help you. I also encourage you to work with other students that will be taking this course.

2. **This packet will count as part of your first quarter grade.** I would prefer you completing this assignment packet in the weeks before school starts, so that the review concepts will be fresh on your mind for the first day of school.

3. You will need a graphing calculator for this course. If you do not have one, I would highly recommend that you purchase a TI-84+ (Texas Instrument-84 plus). You should have been using it in your Trigonometry/Pre-Calculus class already.'

4. Do all your work on a separate sheet(s) of paper. Do not try and squeeze all your work and solutions on this packet. You DO NOT need to print this packet unless you want to.

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Find the slopes of these lines.

1. Horiztonal line through (3,5)
2. line through $(2,-6)$ *and* $(5,-12)$

Find an equation for each line.

3. through (1,2) with $m = -2$

4. through (2,0) and (3,1), in slope-intercept form

5. through (1,7) with undefined slope

6. through (1,7) with $m = 0$

7. through $(-1,-3)$ parallel to the graph of $y = 3x - 5$, in general form

8. through (2,3) perpendicular to the graph of $2x - 3y = 7$

9. Show work to determine if $(3,5)$, $(7,0)$, and $(-1,11)$ are collinear (lie on the same line.)

Use your graphing calculator for problems 10-18. Answers should be accurate to three or more decimal places (rounded or truncated).

10. Find an appropriate window to show a complete graph of $y = x^3 + 4x^2 - 5x$. Your window should show all zeros and all local maximum and minimum points (turn-around points).

    Draw a window rectangle on your own paper and accurately draw the graph. Indicate the scale on the graph or give the window setting.

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11. Find the zeros of $y = f(x) = x^3 + 4x^2 - 5x$. Write the equation you are solving on your paper.

12. Find $f(-2.1576)$ for this same function.

13. Find the x- and y-coordinates of the local maximum and minimum points of $f(x)$.

14. Find the intersection points of the $f(x)$ function and $g(x) = -3x^2 - 5x + 15$. Write the equation you are solving.

15. Solve $x^3 + 4x^2 - 5x = -3x^2 - 5x$.

16. Solve $x^3 + 4x^2 - 5x \le 0$. Write your answer in interval notation.

17. Find the points of intersection of the graphs of $x^2 + y = 4$ and $2x - y = 1$. Write the equation you are solving.

18. Find the x-coordinate(s) of the point(s) of intersection of the graphs of $x + y = 7$ and $2x - 3y = -1$. Write the equation you are solving.

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19. If $f(x) = 3x - 2$, find the following.

a. $f(0)$ b. $f(-3)$ c. $f(b)$ d. $f(x-1)$

20. If $g(x) = \dfrac{|x|}{x}$, find the following.

a. $g(2)$ b. $g(-2)$ c. $g(x^2)$

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Find the domain and range of the given function and draw its graph. When possible make use of the parent graphs in this lesson. You may use your calculator.

21. $f(x)=\sqrt{x+1}$ 22. $g(x)=x^2+2$ 23. $h(x)=4-x$

Evaluate each of the following

24. Given $f(x)=x^2$

a. evaluate *f(3)*
b. evaluate *f(a)*
c. evaluate *f(a+b)*

25. Given $f(x)=2x^3+3x$

a. evaluate *f(-2)*
b. evaluate *f(b)*
c. evaluate but do not simplify $f(x+\Delta x)$
d. evaluate but do not simplify the following expression $\dfrac{f(x+\Delta x)-f(x)}{\Delta x}$

26. If $f(x)=\sqrt{x}$ and $g(x)=x^2-1$, find the following.

a. $f(g(1))$ b. $g(f(1))$ c. g(f(x))

27. If $f(x)=x+1$ and $g(x)=\dfrac{1}{x}$, find the following.

a. f(g(x)) b. the domain of (f(g(x))
c. g(f(x)) d. the domain of (g(f(x))

Find the inverse function for each of the following showing organized work.

28. $y=2x-1$ 29. $g(x)=x$ 30. $h(x)=\sqrt{x}$

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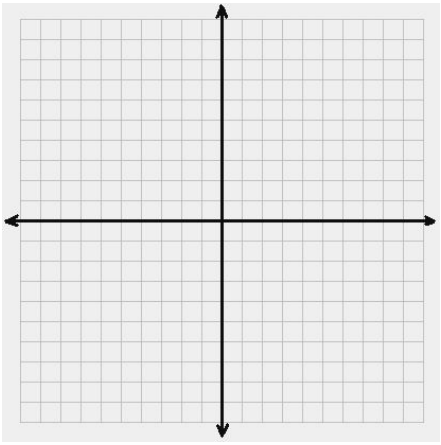
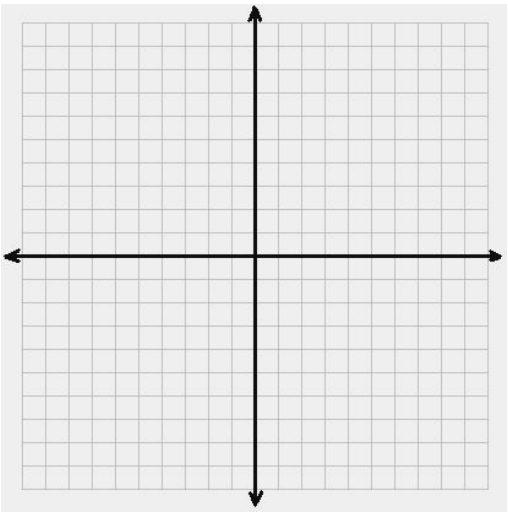
31. Draw a graph of $h(x)$ and $h^{-1}(x)$ from problem 30. Did your answer on problem 30 include the domain restriction needed for $h^{-1}(x)$?



32. Without using a calculator graph this piecewise function.

$$f(x)=\begin{cases} x+2, & x<-2 \\ -x, & -2\le x\le 2 \\ x^2-6, & x>2 \end{cases}$$



Find the zeros of these functions without using a calculator.

33. $f(x)=\dfrac{x^2-3x+2}{x^2-1}$

34. $g(x)=2x^3-8x$

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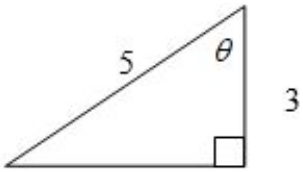
35.

Trig Review

Example 1: Use the triangle at right to find

a. $\sin\theta$ c. $\tan\theta$ d. $\sec\theta$



36.

Convert each common radian measure to degrees

a. $\frac{\pi}{2}$ b. $\frac{\pi}{4}$ c. $\frac{\pi}{3}$ d. $\frac{\pi}{6}$

37. Convert each common degrees to radian measure

a. 120° b. -330° c. 270° d. 150°

38.

A unit circle is created by letting $r = 1$ when dealing with the circular trig functions.

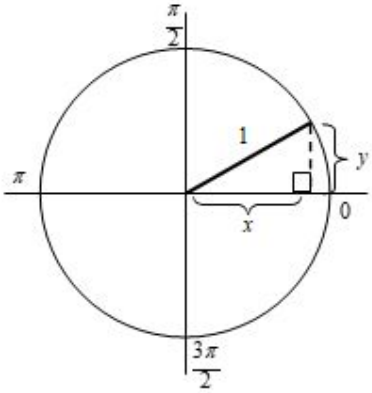
Then, $\sin\theta = y$, $\cos\theta = x$, and $\tan\theta = \frac{y}{x}$.

Example 8: Use a unit circle to find:

a. $\sin\frac{\pi}{6} =$ b. $\sin 0 =$ c. $\cos 0 =$

d. $\sin\frac{\pi}{2} =$ e. $\tan\left(\frac{-\pi}{2}\right) =$ f. $\tan\pi =$

g. $\csc\frac{3\pi}{2} =$ h. $\cos\frac{3\pi}{2} =$



39. Convert each of the following from exponential to logarithmic form

a. $25 = 5^2$ b. $y=x^3$ c. $3^0=1$

40. Convert each of the following from logarithmic to exponential form

a. $\log_2 8=3$ b. $\log_5 1=0$ c. $\ln e = 1$

41. Solve the following equations rounding to 3 decimal places

a. $10^x=80$ b. $2^x=100$ c. $e^x=16$

AP Calculus Summer Assignment – Graphing Activity

This is a review of the graphs you must know for this course. You will be making a library of graphs for this assignment. You will be responsible for knowing these functions without the use of your graphing calculator, but please check your calculator before making your final sketch.

You must include ALL of the following for each graph:

- Each graph is to be placed on a separate sheet of paper (you can use the back sides)
- Labeled x and y axis (use a ruler please!)
- At least one numerical unit indicated on each the x and y axis
- Equation of the graph written next to the graph
- Domain and range expressed next to equation
- At least three coordinates of your choosing (round to 3 decimal places)

Please be neat with your work. You have plenty of time to complete this so don't be sloppy, quick, or haphazard with your work.

1) $y = x$ 2) $y = x^2$ 3) $y = x^3$ 4) $y = \frac{|x|}{x}$

5) $y = |x|$ 6) $y = \sin x$ 7) $y = \cos x$ 8) $y = \tan x$

9) $y = e^x$ 10) $y = \ln x$ 11) $y = \log x$ 12) $y = 10^x$

13) $y = \frac{1}{x}$ 14) $y = \frac{1}{x^2}$ 15) $y = \sqrt{x}$ 16) $y = \sqrt[3]{x}$

17) $y = \sqrt{4^2 - x^2}$ 18) $y = \sqrt{a^2 - x^2}$

19) Piecewise function:

$y = 2x + 1$ for $x > 2$

$y = 3$ for $x \leq 2$