AP Calculus Summer Assignment

To: All students enrolled in AP Calculus AB/BC
From: AP Calculus teacher, Mr. Collins

The following is the Summer Assignment for students who are taking AP Calculus at Steinbrenner HS for the 2021-2022 school year. If you took AP Calculus AB last year, this is a new assignment, and ***DOES*** need to be completed by August 10th, 2021.

Step 1: Follow this link: Summer Packet - Calculus (flippedmath.com)

Step 2: Complete the Calculus Summer Packet for your own review

Step 3: Check your answers with the posted solutions from the same website above

Step 4: Print this Summer Packet (pages 3-10). Complete it. SHOW ALL WORK in the packet. This is different than the problems in Steps 1 & 2. This is due in class Tuesday, August 10, 2021. NO EXCEPTIONS! Work together if needed, use resources, solve EVERY problem! Bring THIS PACKET and a binder to class on the first day of school!

Credit will not be given for answers not supported by adequate work. The Summer Packet grade will be entered in the Homework Category.

1-32 Correctness Score ____ / 32 **1-32 Completeness Score ____ / 32**

Topic A, B, C Correctness Score ____ / 26 **Topic A, B, C Completeness Score ____ / 26**

Step 5: Take the Calculus Readiness Test and PRINT your results page. Do not lose the results page! Staple your results page to the back of the Summer Packet.

Follow this link: https://mdtp-wri.ucsd.edu/practice_tests/index.php?show_instructions=3

Instructions

1. For each problem you are to select exactly one correct answer from the five choices.
2. To change a response, either select another answer or click the response again to select no response.
3. If you find certain questions difficult or time consuming, you can return to them after you have gone through the rest of the test.
4. In scoring the test, only correct answers will be counted. If you have no idea which of the answers to a given question is the correct one, you should not select an answer. If you happen to guess correct answers to questions that you do not understand, your results may be less useful since they may indicate some understanding that you do not have.

Your test will not be graded until you click the "Finish Test" button. Do not close your web browser or you will lose any answers you have already entered. Once your test is scored you will not be allowed to go back and change any answers. Print the results page! Staple your results page to the back of the Summer Packet.

An Introduction to Calculus:

In some ways, Calculus involves taking what you already know a step further. You know how to find the slope of a line, right? You probably don't know how to find the slope of a curve because it's constantly *changing* – but Calculus helps us do that. 'Traditional' math tells us how to find the slope of a line, and Calculus tells us how to find the slope of a curve. 'Traditional' math tells us how to find the length of a rope pulled taut, but Calculus tells us how to find the length of a curved rope. 'Traditional' math tells us how to find the area of a flat, rectangular roof, but Calculus tells us how to find the area of a curved dome-shaped roof. Get the idea?
How does Calculus manage to pull this off? Imagine a curve like this:

If you were to zoom in a few times, each part of the curve would kind of look like a line, wouldn't it? And if "a few times" wasn't enough, you could zoom in more. And more. And more. In fact, you could zoom in nearly an infinite number of times until the curve became enough like a line that you could treat it that way. "What makes calculus such a fantastic achievement is that it actually zooms in *infinitely*. In fact, everything you do in calculus involves infinity in one way or another, because if something is constantly changing, it's changing infinitely often from each infinitesimal moment to the next." (excerpt taken from http://media.wiley.com/product_data/excerpt/84/07645249/0764524984.pdf)

This process – doing something an infinite number of times until the problem becomes figure-out-able – is the foundation of Calculus. The process is called a "limit" and it's what we'll be talking about in our first month of Calculus together.

Name: _____ Date:_____ Period: _____

Summer Packet

ABSOLUTELY NO CALCULATOR! You must show ALL work! This is due in class Tuesday, August 10, 2021. NO EXCEPTIONS! Work together if needed, use resources, solve EVERY problem!

Given $f(x) = x^2 - 3x + 2$, find the following. NO CALCULATOR!

1. $f(-3) =$

2. $f(x+1) =$

Write the equation of the line that meets the following conditions. Use point-slope form.
$y - y_1 = m(x - x_1)$

3. $m = \frac{2}{3}$ and $f(4) = -5$

4. $f(-3) = 6$ and $f(5) = -1$

Rewrite the following using rational exponents. NO CALCULATOR!

5. $\sqrt[3]{x^2} + \sqrt[4]{3x}$

6. $\frac{1}{5\sqrt{x}} + 3\sqrt{x-1}$

7. $\frac{1}{5x^4} - \frac{1}{2}\sqrt[7]{x^5}$

Write each expression in radical form and positive exponents. NO CALCULATOR!

8. $x^{-\frac{1}{3}} + x^{\frac{5}{2}}$

9. $\frac{1}{4}x^{-\frac{1}{2}} + x^{-5}$

10. $6x^{-3} + \frac{2}{5}x^{-1}$

Need to know basic trig functions in RADIANS! We never use degrees. You can either use the Unit Circle or Special Triangles to find the following. NO CALCULATOR!

11. $\sin\frac{\pi}{4}$	12. $\cos\frac{\pi}{3}$	13. $\sin\frac{\pi}{2}$
14. $\tan 2\pi$	15. $\sec\frac{\pi}{2}$	16. $\cos\pi$

Solve the following equations. NO CALCULATOR!

17. $\ln(6x+1)=0$	18. $4e^{3x}-7=1$	19. $e^x+3xe^x=0$

Solve the following trig equations where $0 \le x \le 2\pi$. NO CALCULATOR!

20. $\sin x=1$	21. $\cos x=0$	22. $\sin\left(\frac{x}{2}\right)=1$

23. $\cos(x)=\frac{\sqrt{3}}{2}$	24. $\sin x=\frac{\sqrt{2}}{2}$

For each function, determine its domain. NO CALCULATOR!

Function	**Domain**
25. $y=\sqrt{x+7}$	
26. $y=\ln(x-5)$	
27. $y=e^{x+1}$	

Simplify. NO CALCULATOR!

28. $\frac{x}{\sqrt{x}}$

29. $e^{3-\ln x}$

30. $16^{\frac{3}{2}}$

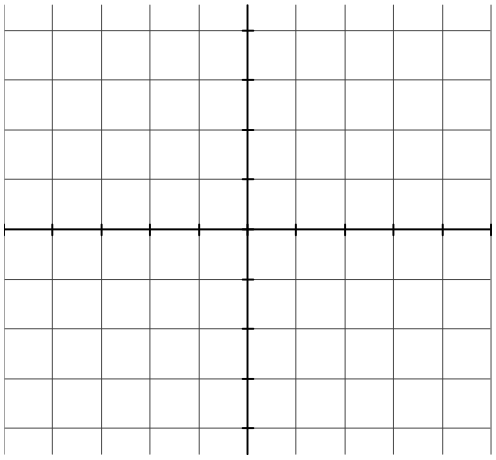
31. $\left(2x^{\frac{3}{4}}\right)\left(4x^{\frac{3}{2}}\right)$

32. $\left(9x^{4/3}\right)^{3/2}$

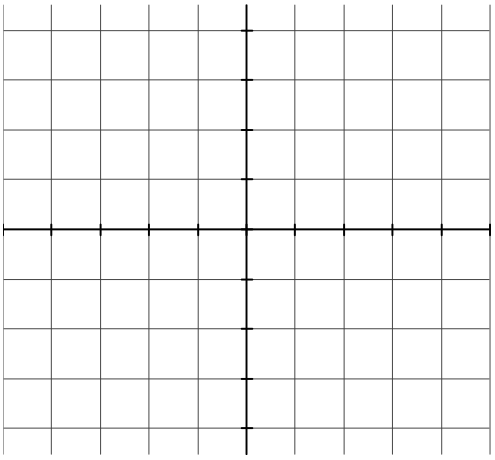
Topic A: Graphs of Common Functions

Sketch each of the following as accurately as possible. **You will need to be VERY familiar with each of these graphs throughout the year**. Again, these are VERY important graphs to know. Be very accurate with regards to "open circles" and "closed circles" as those features may not be revealed on a graphing utility.

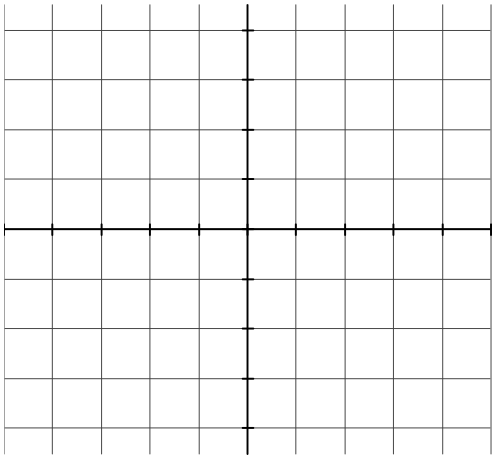
1. $y = x$



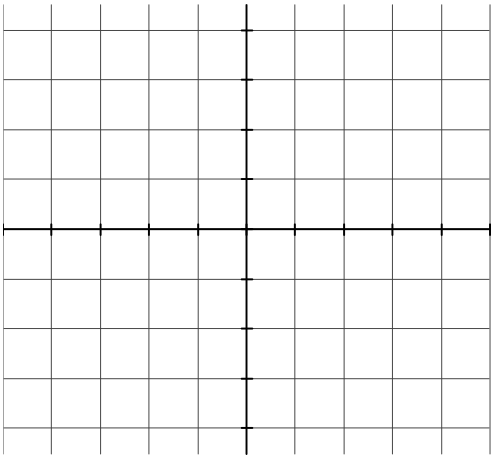
2. $y = x^2$



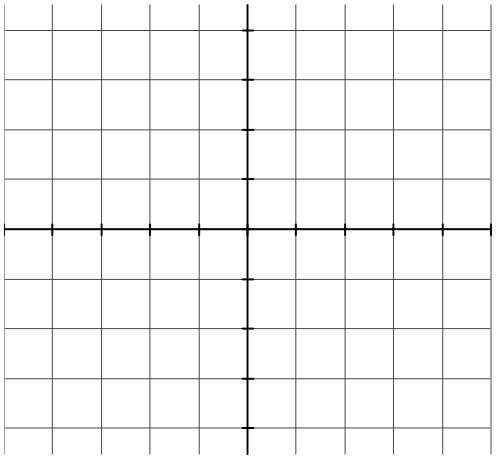
3. $y = x^3$



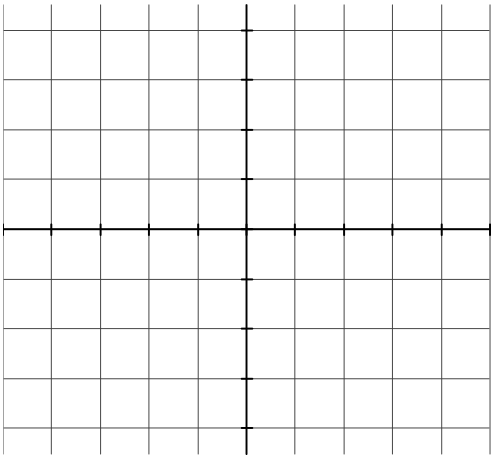
4. $y = \sqrt{x}$



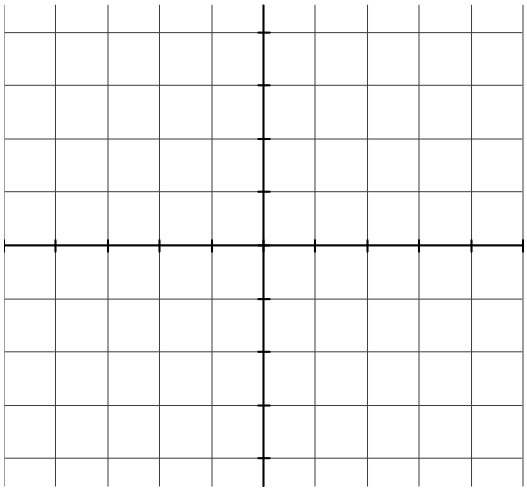
5. $y = |x|$



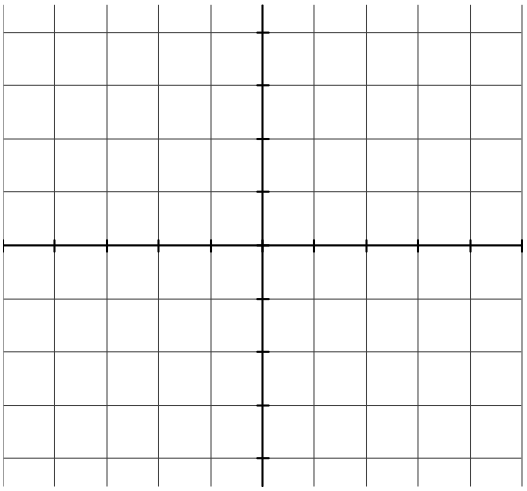
6. $y = \dfrac{|x|}{x}$



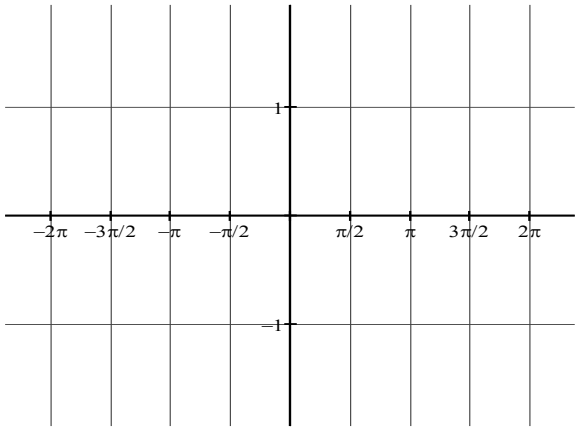
7. $y = x^{1/3}$



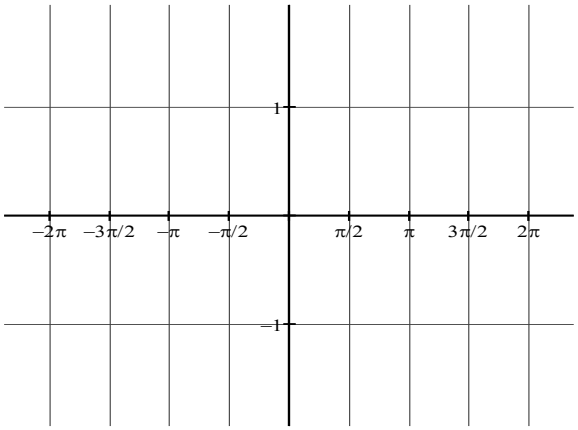
8. $y = x^{2/3}$



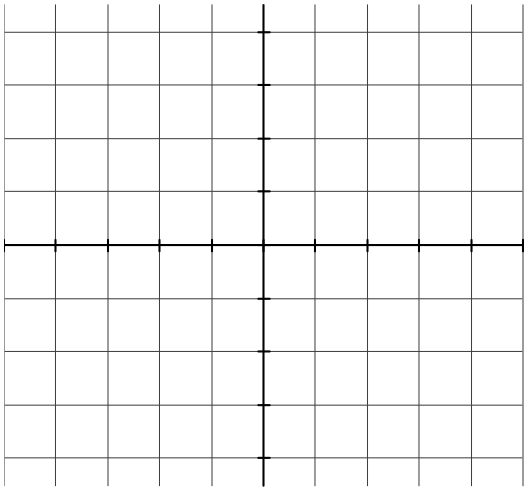
9. $y = \sin x$



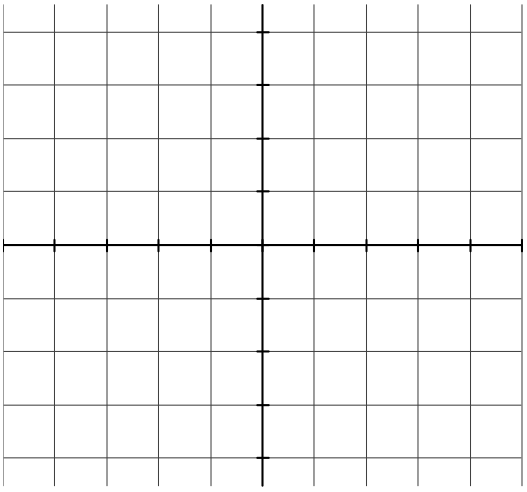
10. $y = \cos x$



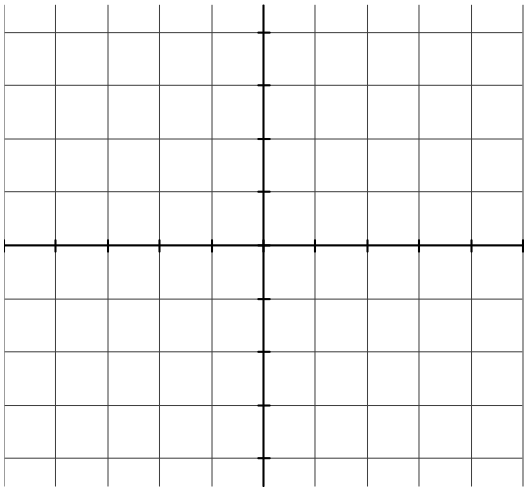
11. $y = e^x$



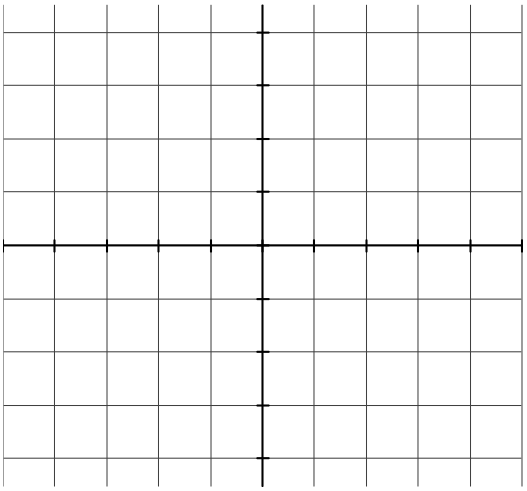
12. $y = \ln x$



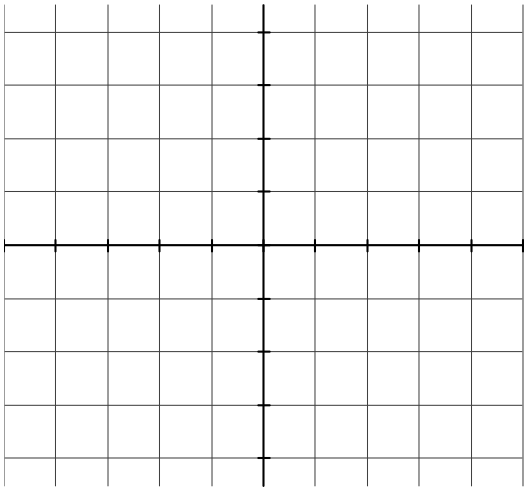
13. $y = \dfrac{1}{x}$



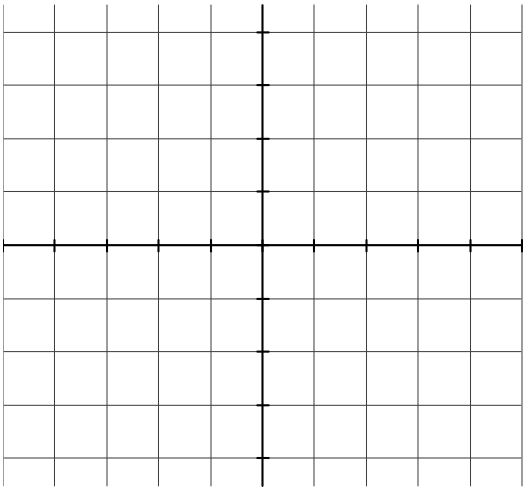
14. $y = [\![x]\!]$



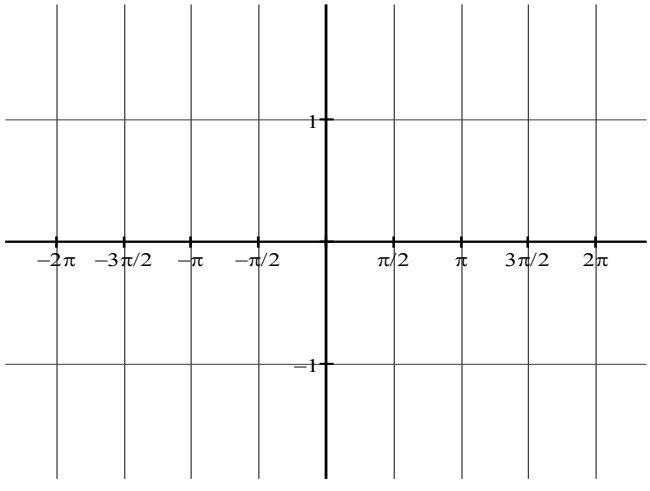
15. $y = \dfrac{1}{x^2}$



16. $y = 2^x$



17. $y = \tan x$



Topic B: Linear Functions

18.) Find the equation of the line in point-slope form, with the given slope, passing through the given point.

a.) $m=-7,\ (-3,-7)$ b.) $m=-\frac{1}{2},\ (2,-8)$ c.) $m=\frac{2}{3},\ \left(-6,\frac{1}{3}\right)$

19.) Find the equation of the line in point-slope form, passing through the given points.

a.) $(-3,6),\ (-1,2)$ b.) $(-7,1),\ (3,-4)$ c.) $\left(-2,\frac{2}{3}\right),\ \left(\frac{1}{2},1\right)$

20.) Find the equations of the lines through the given point that are a.) parallel and b.) normal to the given line.

a.) $(5,-3),\ x+y=4$ b.) $(-6,2),\ 5x+2y=7$ c.) $(-3,-4),\ y=-2$

Topic C: Asymptotes

For each function, find the equations of both the vertical asymptote(s) and horizontal asymptote (if it exists) and the location of any holes.

21.) $y = \frac{x-1}{x+5}$

22.) $y = \frac{8}{x^2}$

23.) $y = \frac{2x+16}{x+8}$

24.) $y = \frac{2x^2+6x}{x^2+5x+6}$

25.) $y = \frac{x}{x^2-25}$

26.) $y = \frac{x^2-5}{2x^2-12}$