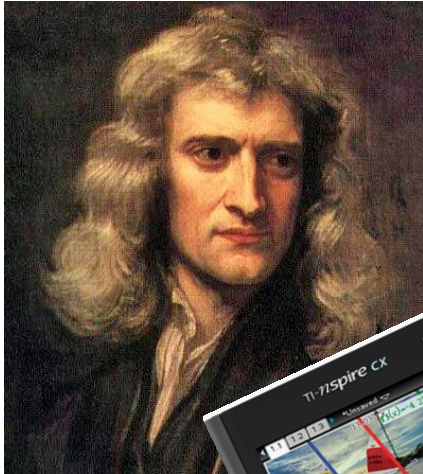


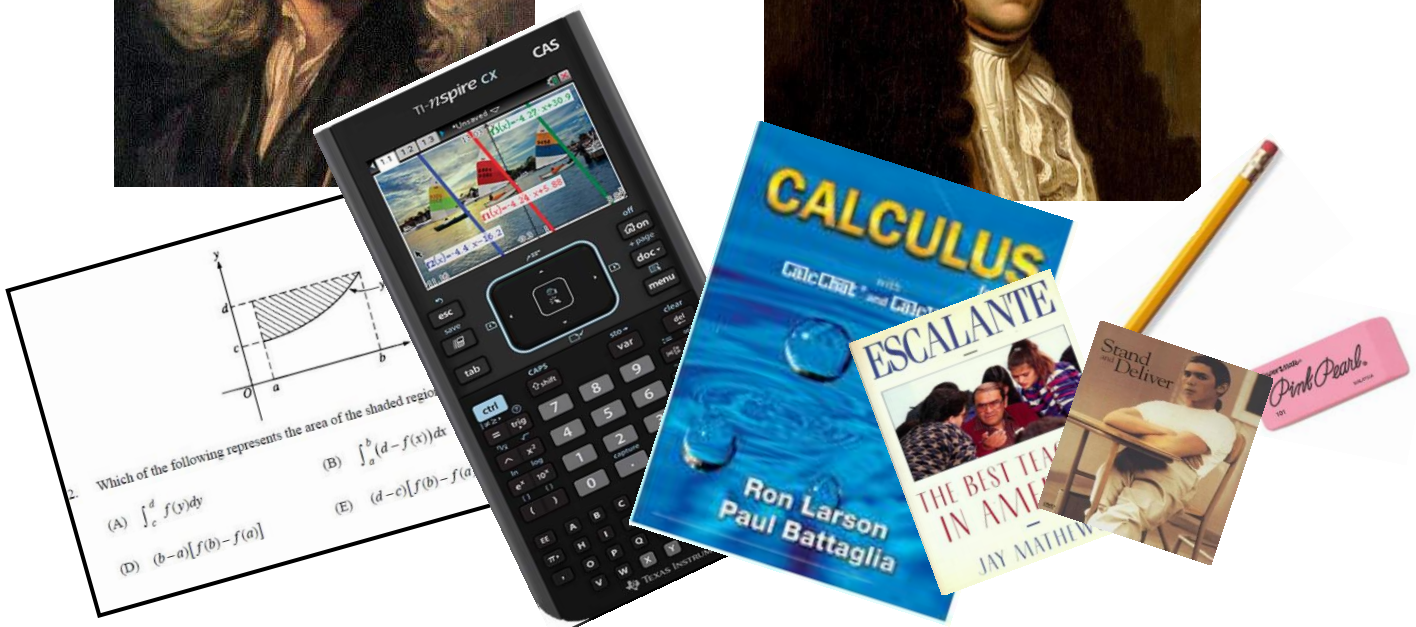
Dreher High School

AP Calculus AB

Isaac Newton



Gottfried Wilhelm Leibniz



Summer Packet – 2026

Name _____

Period _____

Due Monday, August 6, 2026

Post any questions to the Schoology Discussion Board in the Summer 2026 Group

Summer Packet grades will be entered in the Minor Category

Dreher High School

AP Calculus AB

Congratulations on your decision to take AP Calculus AB! All the hard work you have put into your mathematics learning over the past several years has finally culminated into this particular course. The first few pages of this packet will serve as a quick overview of the year ahead including information about the TI-Nspire CX graphing calculator. Like a few other AP classes, there is a fair amount of Summer Work I'd like you to take on. Overall, you should not need to invest much more than 10 hours. I would suggest also that you spread the work of the packet out over the course of the summer so that you can still enjoy your summer. After all, you've earned it!

Here is an invitation code to my Summer 2026 Schoology group: **WCF6-GGVC-HMWDQ**

I **strongly** encourage you to join this group ASAP so you do not miss any important information.

Once you are a member of this Schoology Group, you can check for updates and even discuss problems you are having with any of the problems on the AP Calculus Summer Packet.

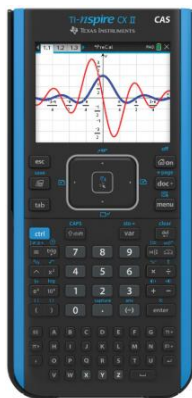
Once the school year begins, we will use our Schoology Course site exclusively and you will no longer need to return to the Summer 2026 Schoology Group.

Calculator Information

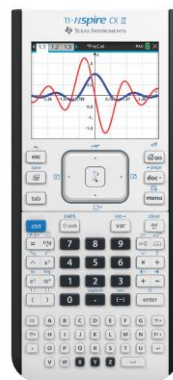
During their two years of calculus, (AP Calculus AB and AP Calculus BC), as well as AP Statistics, students will use either the Texas Instruments® TI-Nspire CX or the TI-Nspire CX CAS graphing calculator.



TI-Nspire CX CAS



TI-Nspire CX II CAS



TI-Nspire

Dreher High School charges a \$25 rental fee each year for the use of the TI-Nspire or TI-Nspire CX CAS calculator for students who do not own their own calculator. If you are interested in purchasing your own calculator, it may be very advantageous to do so. The majority of students who enroll in AB and BC Calculus purchase their own and find it very beneficial in both high school and college in their mathematics and science courses.

Please note, that while able to use on the College Board AP Exams, students may not use a CAS (Computer Algebra System) graphing calculator on the ACT, the SAT, and the PSAT.

Even if the colleges don't allow the use of the calculator on exams, former students have communicated to us they use them extensively to help them better understand assignments and lecture notes. The TI-Nspire is an invaluable tool to use in statistics, chemistry and physics. There are two versions of the TI-Nspire CX calculator (CAS and non-CAS). As you can see from the images above, there are two models of the CAS

version. All models are acceptable at DHS, but the TI-Nspire CX II CAS has a couple other nice helpful features that students tend to enjoy along with a slightly quicker processor. The two models are virtually the same price.

As of May 2026, the best price (\$139.99) I have seen for the TI-Nspire CX can be found at

https://www.walmart.com/ip/One-TI-Nspire-with-Recharge-Battery/344727554?wmlspartner=wlp&selectedSellerId=101324932&adid=2222222227344727554_101324932_14069003552_202077872&wl0=&wl1=g&wl2=c&wl3=42423897272&wl4=pla-2449037643288&wl5=9010372&wl6=&wl7=&wl8=&wl9=pla&wl10=736905370&wl11=online&wl12=344727554_101324932&veh=sem&gad_source=4&gad_campaignid=202077872&gbraid=0AAAAADmfBlqCHI93L3yZl-lqPiXCvtfO0&gclid=CjwKCAjwwpDQBhAuEiwAa-4WoxPq_636y8cCK6u5F4tIVxaCSnH1u2PNIAjDwdxtlrVomubQNCnnlxoCrWwQAvD_BwE

As of May 2026, the best price (\$134.99) I have seen for the TI-Nspire CX II CAS can be found on

https://www.target.com/p/texas-instruments-nspire-cx-ii-cas-graphing-calculator-black/-/A-88836226?sid=&TCID=PDS-22806998623&gclsrc=aw.ds&gad_source=4&gad_campaignid=22803281174&gbraid=0AAAAAD-5dfYbmGdsX-TGnhJ2Z8shWaM0d&gclid=CjwKCAjwwpDQBhAuEiwAa-4Wo0okM8gx9Ry7osA-ymr_92ve4FipzwFpF-4TgUALKopPsVLFW0tOHBoCkEsQAvD_BwE

As of May 2026, the next best price (\$154.95) I have seen for the TI-Nspire CX II CAS can be found on

https://www.walmart.com/ip/Texas-Instruments-TI-Nspire-CX-II-CAS-Color-Graphing-Calculator-with-Student-Software-PC-Mac-Blue/239184912?wmlspartner=wlp&selectedSellerId=101549712&sourceid=dsn_gdn_0c92c416-dbd6-42ec-845c-ecf69af2153d&veh=dsn&wmlspartner=dsn_gdn_0c92c416-dbd6-42ec-845c-ecf69af2153d&cn=0042_fy27_mp_mpa_lo_int_dis_pmax-p13n&wl9=pla&wl11=online&gad_source=4&gad_campaignid=23148469844&gbraid=0AAAAADmfBlO37lQqEDk4r6HgoHmnC0jhU&gclid=CjwKCAjwwpDQBhAuEiwAa-4Wo4MphFT24BAyiFX9VPB4AIqoWkyo9ZFIMGW1AoZCW-qLLXZMzhxFCRoC5-cQAvD_BwE

Also, it is important to mention that neither of the CX CAS models are available in retail stores. The non-CAS version of the CX is in stores however. I have seen many of my students find good deals on used TI-Nspire CX (non-CAS and CAS) calculators on E-Bay as well.

Name _____

AP Calculus AB
Summer Review Packet

Topic A: Functions

1.) If $f(x) = 4x - x^2$, find:

a.) $f(4) - f(-4)$

b.) $\sqrt{f\left(\frac{3}{2}\right)}$

c.) $\frac{f(x+h) - f(x)}{2h}$

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

a.) $V\left(\frac{3}{4}\right)$

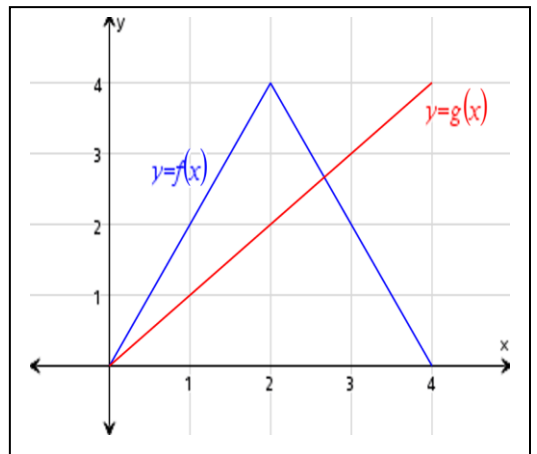
b.) $V(r+1) - V(r-1)$

c.) $\frac{V(2r)}{V(r)}$

3.) If $f(x)$ and $g(x)$ are given in the graph to the right, find:

a.) $(f - g)(3)$

b.) $f(g(3))$



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

a.) $f(0) - f(2)$

b.) $\sqrt{5 - f(-4)}$

c.) $f(f(3))$

Topic B: Domain and Range

Find the domain of the following functions using interval notation. You must show any necessary work and not rely only on the graph produced by a calculator.

1.) $f(x) = 3$

2.) $y = x^3 - x^2 + x$

3.) $y = \frac{x^3 - x^2 + x}{x}$

4.) $y = \frac{x-4}{x^2-16}$

5.) $f(x) = \frac{1}{4x^2 - 4x - 3}$

6.) $y = \sqrt{2x-9}$

7.) $y = \log(x-10)$

8.) $y = \frac{\sqrt{2x+14}}{x^2-49}$

Find the range of the following functions:

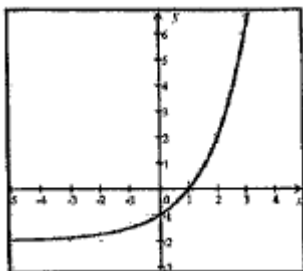
9.) $y = x^4 + x^2 - 1$

10.) $y = e^x$

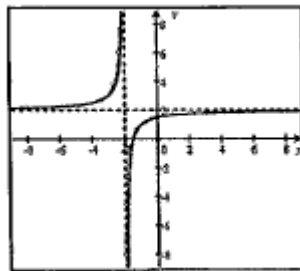
11.) $y = \sqrt{x^2+1} + 1$

Find the domain and range of the following functions using interval notation.

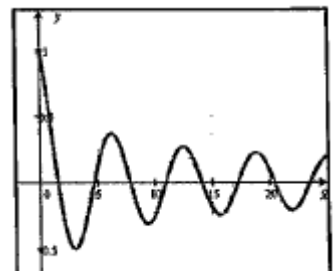
12.)



13.)



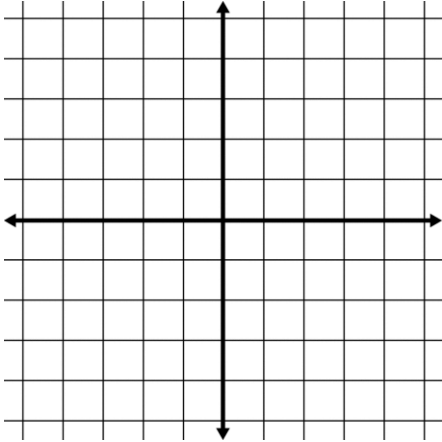
14.)



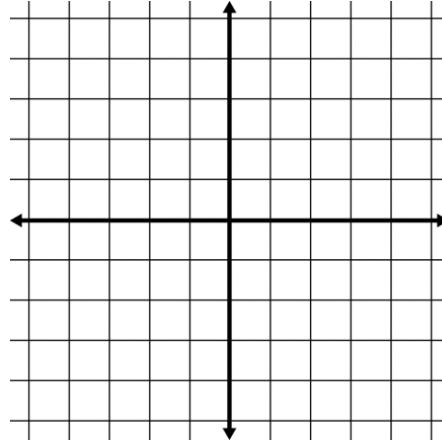
Topic C: Graphs of Common Functions

Sketch each of the following as accurately as possible. **You will need to be VERY familiar with each of these graphs throughout the year.** You may use a graphing calculator for some of them if you have access to one over the summer. If you plan on renting a TI-Nspire and thus do not have one for the summer, I strongly recommend you use try www.desmos.com. There is an app for Desmos as well that is free that you can install on your phones. 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.

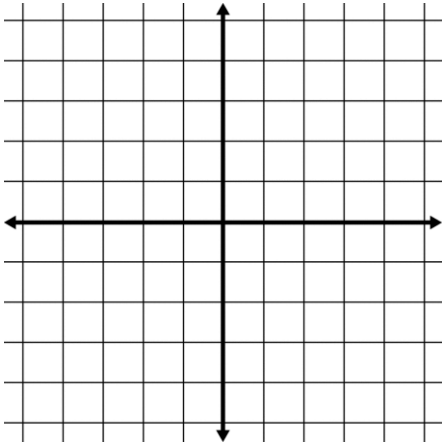
1. $y = x$



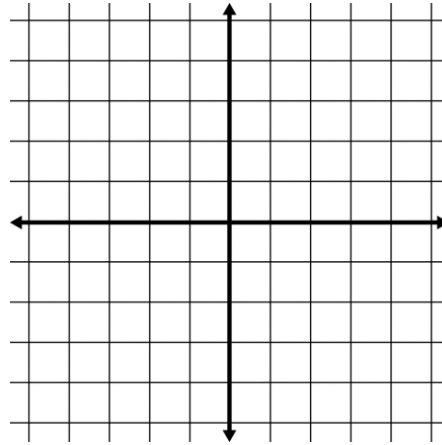
2. $y = x^2$



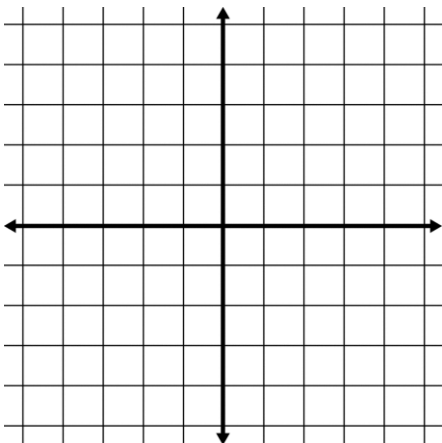
3. $y = x^3$



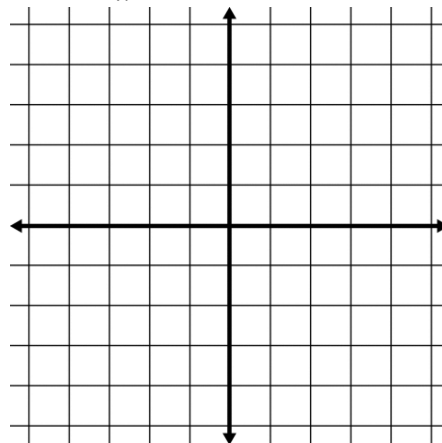
4. $y = \sqrt{x}$



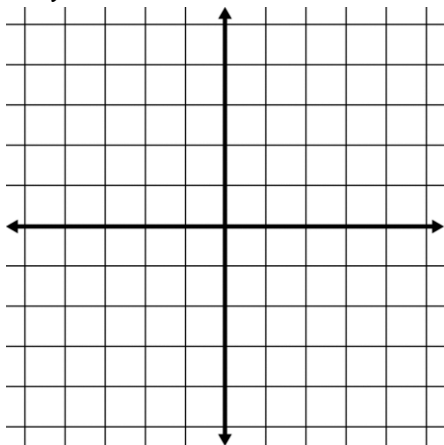
5. $y = |x|$



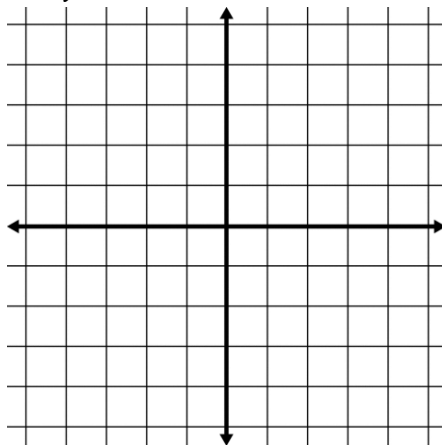
6. $y = \frac{|x|}{x}$



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

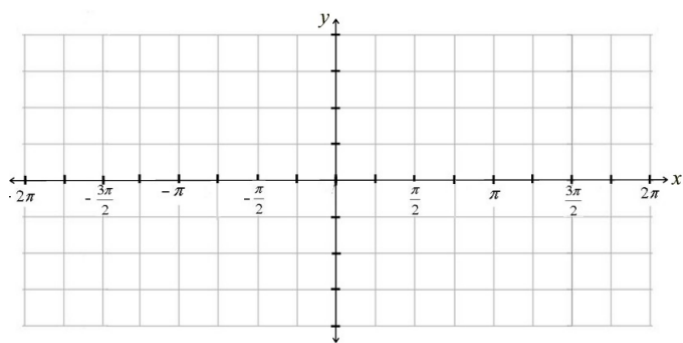


8. $y = x^{2/3}$

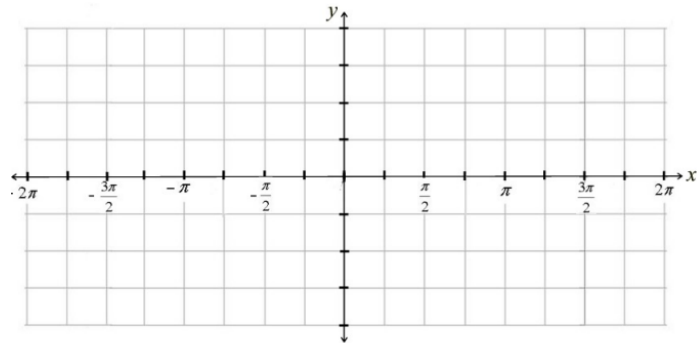


Note: For all trigonometric coordinate planes, use a scale of $\frac{1}{4}$ unit per square on the y -axis.

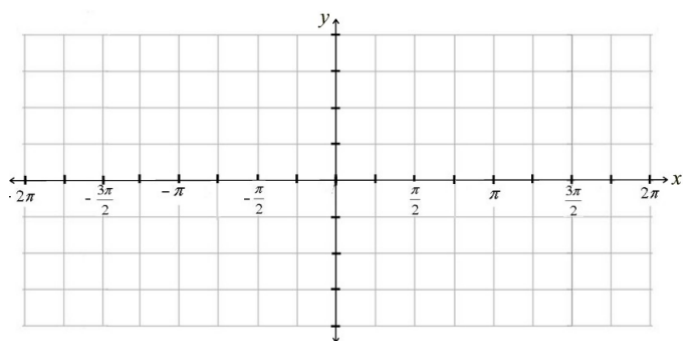
9. $y = \sin x$



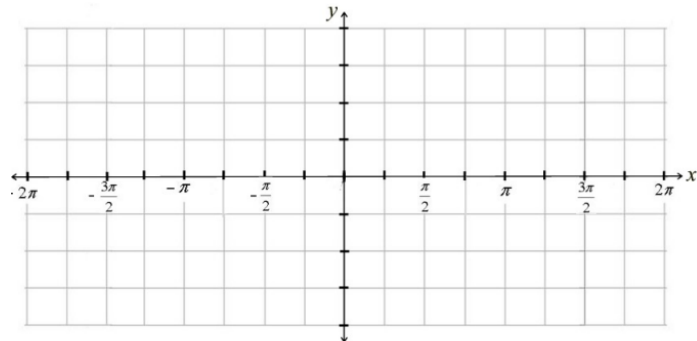
10. $y = \cos x$



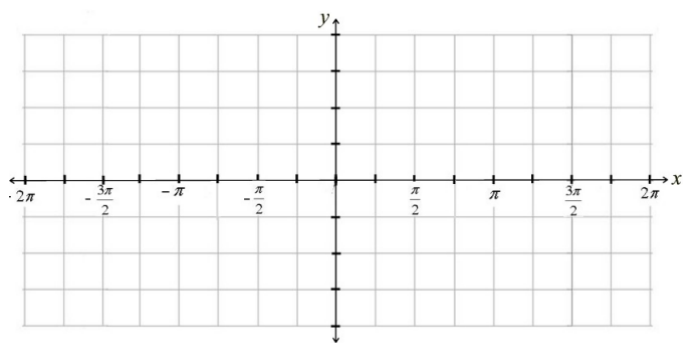
11. $y = \tan x$



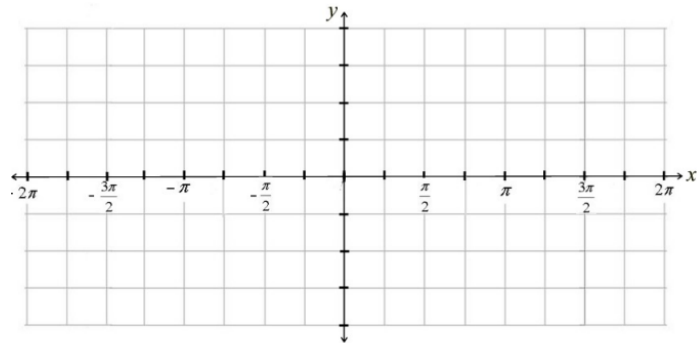
12. $y = \cot x$



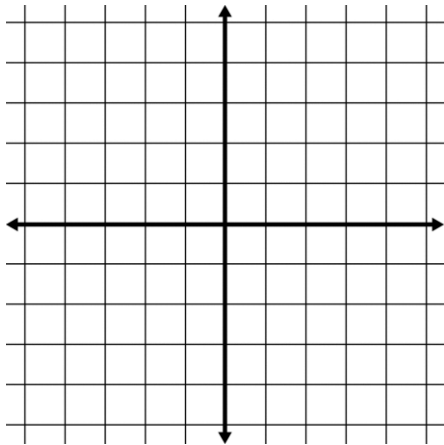
13. $y = \sec x$



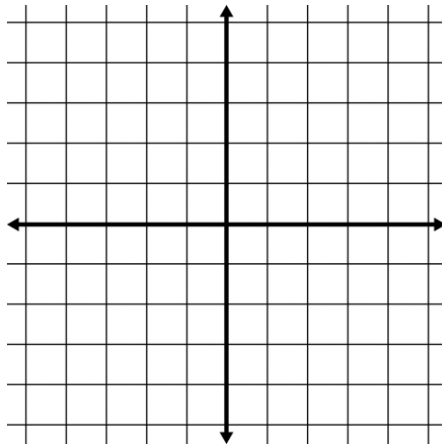
14. $y = \csc x$



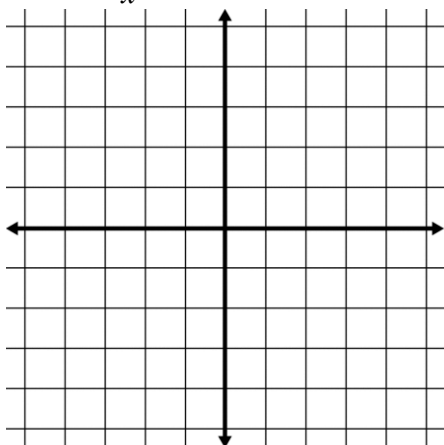
15. $y = e^x$



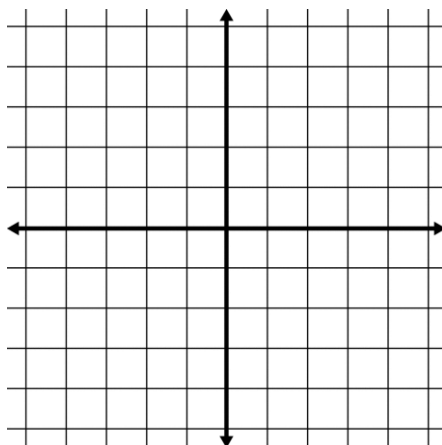
16. $y = \ln x$



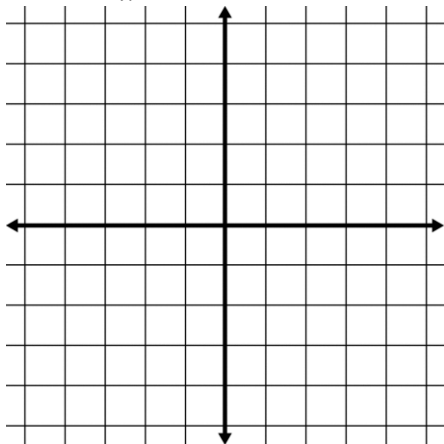
17. $y = \frac{1}{x}$



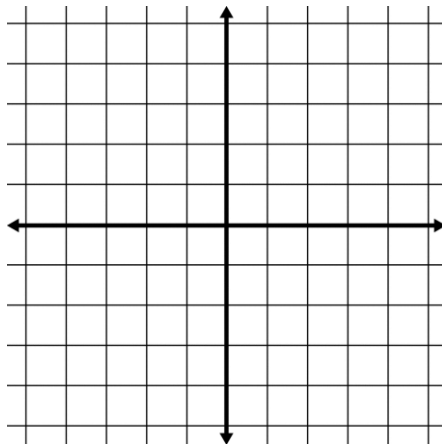
18. $x^2 + y^2 = 1$



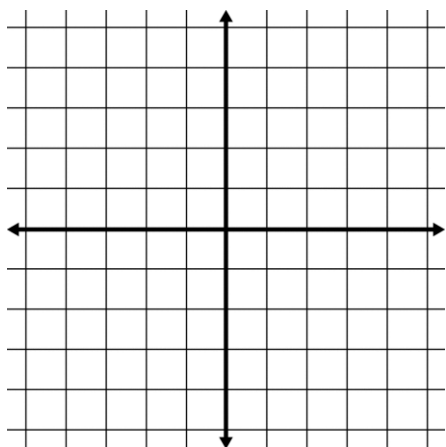
19. $y = \frac{1}{x^2}$



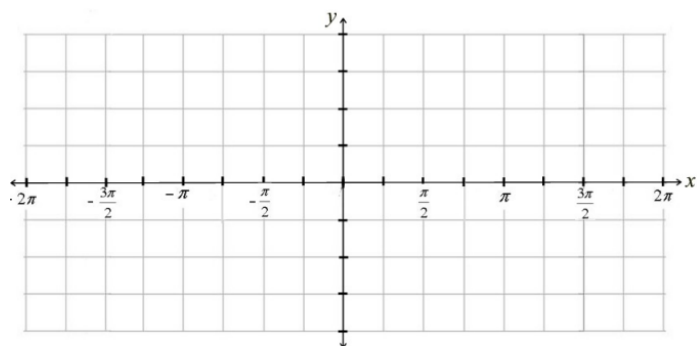
20. $y = 2^x$



21. $y = \sqrt{4 - x^2}$



22. $y = \frac{\sin x}{x}$ (Hint: There should be a “hole” on your curve.)



Topic D: Special Factorization

Factor completely.

Hint: For Problems 1 through 3, research “Sum/Difference of Cubes.”

For Problems 5, 7, and 8, research “Factor by Grouping.”

1.) $x^3 + 8$

2.) $x^3 - 8$

3.) $27x^3 - 125y^3$

4.) $x^4 + 11x^2 - 80$

5.) $ac + cd - ab - bd$

6.) $2x^2 + 50y^2 - 20xy$

7.) $x^2 + 12x + 36 - 9y^2$

8.) $x^3 - xy^2 + x^2y - y^3$

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

(Hint: Look for common binomial factors.)

Topic E: Linear Functions

1.) 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.) $m = \frac{2}{3}$, $\left(-6, \frac{1}{3}\right)$

2.) 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.) $\left(-2, \frac{2}{3}\right)$, $\left(\frac{1}{2}, 1\right)$

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

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

4.) Find the equation of the line in general form, containing the point $(4, -2)$ and parallel to the line containing the points $(-1, 4)$ and $(2, 3)$.

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

Topic F: Solving Quadratic and Polynomial Equations

Solve each equation for x over the real number system. **You must show your work to receive credit.**

1.) $x^2 + 7x - 18 = 0$

2.) $x^2 + x + \frac{1}{4} = 0$

3.) $2x^2 - 72 = 0$

4.) $12x^2 - 5x = 2$

5.) $20x^2 - 56x + 15 = 0$

6.) $81x^2 + 72x + 16 = 0$

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

8.) $x^3 - 5x^2 + 5x - 25 = 0$

9.) $2x^4 - 15x^3 + 18x^2 = 0$

10.) If $y = x^2 + kx - k$, for what values of k will the quadratic have two real solutions? **You must show your work to receive credit.**

Topic G: 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.

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

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

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

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

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

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

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

8.) $y = \frac{x^3+4x}{x^3-2x^2+4x-8}$

9.) $y = \frac{10x+20}{x^3-2x^2-4x+8}$

10.) $y = \frac{1}{x} - \frac{x}{x+2}$ (Hint: Express with a common denominator)

Topic H: Complex Fractions

Eliminate the complex fractions. Be sure to show all the steps involved in the simplification.

You must show your work to receive credit.

$$1.) \frac{\frac{5}{8}}{-\frac{2}{3}}$$

$$2.) \frac{4 - \frac{2}{9}}{3 + \frac{4}{3}}$$

$$3.) \frac{2 + \frac{7}{2} + \frac{3}{5}}{5 - \frac{3}{4}}$$

$$4.) \frac{x - \frac{1}{x}}{x + \frac{1}{x}}$$

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

$$6.) \frac{x^{-1} + y^{-1}}{x + y}$$

$$7.) \frac{x^{-2} + x^{-1} + 1}{x^{-2} - x}$$

$$8.) \frac{\frac{1}{3}(3x - 4)^{-3/4}}{-\frac{3}{4}}$$

Topic I: Adding Fractions and Solving Rational Equations

You must show all your work to receive credit for these problems.

1.) Combine the following fractions. Show all work.

a.) $\frac{2}{3} - \frac{1}{x}$

b.) $\frac{1}{x-3} + \frac{1}{x+3}$

c.) $\frac{5}{2x} - \frac{5}{3x+15}$

d.) $\frac{2x-1}{x-1} - \frac{3x}{2x+1}$

2.) Solve the equation for x . Show all work.

a.) $\frac{2}{3} - \frac{1}{x} = \frac{5}{6}$

b.) $\frac{1}{x-3} + \frac{1}{x+3} = \frac{10}{x^2-9}$

c.) $\frac{5}{2x} - \frac{5}{3(x+5)} = \frac{5}{x}$

d.) $\frac{2x-1}{x-1} - \frac{3x}{2x+1} = \frac{x^2+11}{2x^2-x-1}$

Topic J: Absolute Value Equations

Solve the following equations. If you need help, seek out solutions to similar problems to refamiliarize yourself with the process. **You must show all work to receive credit.**

1.) $4|x + 8| = 20$

2.) $|1 - 7x| = 13$

3.) $|8 + 2x| + 2x = 40$

Topic K: Solving Inequalities

Solve the following inequalities. **Be sure to show all your work to receive full credit.**

1.) $5(x-3) \leq 8(x+5)$

2.) $4 - \frac{5x}{3} > -\left(2x + \frac{1}{2}\right)$

3.) $\frac{3}{4} > x+1 > \frac{1}{2}$

4.) $x+7 \geq |5-3x|$

5.) $(x+2)^2 < 25$

6.) $x^3 < 4x^2$

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

Topic L: Exponential Functions and Logarithms

Simplify the following (without a calculator):

1.) $\log_2 \frac{1}{4}$

2.) $\log_8 4$

3.) $\ln \frac{1}{\sqrt[3]{e^2}}$

4.) $5^{\log_5 40}$

5.) $e^{\ln 12}$

6.) $\log_{12} 2 + \log_{12} 9 + \log_{12} 8$

7.) $\log_2 \frac{2}{3} + \log_2 \frac{3}{32}$

8.) $\log_{\frac{1}{3}} \frac{4}{3} - \log_{\frac{1}{3}} 12$

9.) $\log_3 (\sqrt{3})^5$

Solve the following. **You must show all work to receive credit.**

10.) $\log_5 (3x - 8) = 2$

11.) $\log_9 (x^2 - x + 3) = \frac{1}{2}$

12.) $\log (x - 3) + \log 5 = 2$

13.) $\log_2 (x - 1) + \log_2 (x + 3) = 5$

14.) $\log_5 (x + 3) - \log_5 x = 2$

15.) $\ln x^3 - \ln x^2 = \frac{1}{2}$

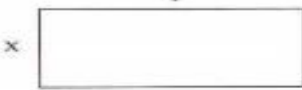
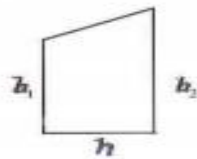
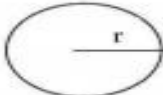
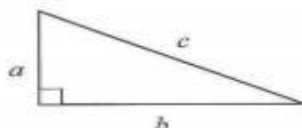
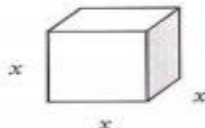
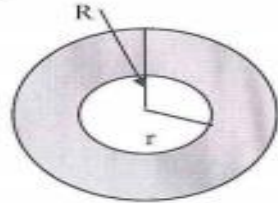
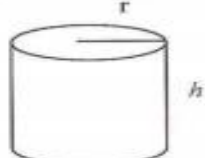
16.) $3^{x-2} = 18$

17.) $e^{3x+1} = 10$

18.) $8^x = 5^{2x-1}$

Topic M: Geometry

1.) You will use each of the following formulas in AP Calculus AB. Complete each of the following.

Square  Perimeter = _____ Area = _____	Rectangle  Perimeter = _____ Area = _____	Trapezoid  Area = _____
Circle  Circumference = _____ Area = _____	Triangle  Pythagorean Theorem (only good for right triangles) = _____ Area (of any triangle) = _____	Cube  Volume = _____ Surface Area = _____
Sphere  Volume = _____	"Washer"  Area of the shaded region = _____	Cylinder  Volume = _____

Topic N: Basic Right-Angle Trigonometry

Solve the following.

For #1-2, if point P is on the terminal side of θ , find all 6 trigonometric functions of θ . (Answers need not be rationalized.)

1.) $P(-2, 4)$

2.) $P(\sqrt{5}, -2)$

3.) If $\cos \theta = -\frac{5}{13}$, in quadrant II,
find $\sin \theta$ and $\tan \theta$.

4.) If $\cot \theta = \frac{2\sqrt{10}}{3}$, in quadrant III,
find $\sin \theta$ and $\cos \theta$.

5.) State the quadrant in which each of the following is true.

a.) $\sin \theta > 0$ and $\cos \theta < 0$

b.) $\csc \theta < 0$ and $\cot \theta > 0$

c.) $\tan \theta > 0$ and $\sec \theta < 0$

Topic O: Special Angles

Evaluate each of the following.

1.) $\sin^2 120^\circ + \cos^2 120^\circ$

2.) $2 \tan^2 300^\circ + 3 \sin^2 150^\circ - \cos^2 180^\circ$

3.) $\cot^2 135^\circ - \sin^2 210^\circ + 5 \cos^2 225^\circ$

4.) $\cot(-30^\circ) + 3 \tan 600^\circ - \csc(-450^\circ)$

5.) $\left(\cos \frac{2\pi}{3} - \tan \frac{3\pi}{4} \right)^2$

6.) $\left(\sin \frac{11\pi}{6} - \tan \frac{5\pi}{6} \right) \left(\sin \frac{11\pi}{6} + \tan \frac{5\pi}{6} \right)$

Determine whether each of the following statements is true or false.

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

8.) $\frac{\cos \frac{5\pi}{3} + 1}{\tan^2 \frac{5\pi}{3}} = \frac{\cos \frac{5\pi}{3}}{\sec \frac{5\pi}{3} - 1}$

9.) $2 \left(\frac{3\pi}{2} + \sin \frac{3\pi}{2} \right) \left(1 + \cos \frac{3\pi}{2} \right) > 0$

10.) $\frac{\cos^3 \frac{4\pi}{3} + \sin \frac{4\pi}{3}}{\cos^2 \frac{4\pi}{3}} > 0$

Topic P: Trigonometric Identities

Verify the following identities.

1.) $(1 + \sin x)(1 - \sin x) = \cos^2 x$

2.) $\sec^2 x + 3 = \tan^2 x + 4$

3.) $\frac{1 - \sec x}{1 - \cos x} = -\sec x$

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

5.) $\csc(2x) = \frac{\csc x}{2 \cos x}$

6.) $\frac{\cos(3x)}{\cos x} = 1 - 4 \sin^2 x$

Topic Q: Solving Trigonometric Equations

Solve each equation on the interval $[0, 2\pi)$. Do not use a calculator. **You must show all work to receive credit.**

1.) $\sin^2 x = \sin x$

2.) $3 \tan^3 x = \tan x$

3.) $\sin^2 x = 3 \cos^2 x$

4.) $\cos x + \sin x \tan x = 2$

5.) $\sin x = \cos x$

6.) $2 \cos^2 x + \sin x - 1 = 0$