

Welcome to AP Calculus!

Welcome to Calculus. This will be the one of the most rigorous classes in your mathematical careers, but the benefit you will receive by having this experience in high school is immense. Because of the unique nature of this class, it is very important that you are ready to start working on the **first day**. The curriculum is based on the premise that college-level material can be taught successfully to able and well-prepared secondary school students. **We will cover all of the topics in the Calculus curriculum which corresponds to at least as much material as a standard first semester course of college Calculus.**

Below are student comments to the questions: “What has worked for you? What has not worked for you? What do you wish someone had told you?” These are combinations of responses from Woodlawn students, other high school students and college students.

- “If I had to suggest to someone how to prepare for Calculus, I would tell them to brush up on his or her algebra. This is the area with which I personally have most of my problems. I just think it is hard to understand a concept when you are trying to figure out the algebra it took to derive the idea.”
- The best advice that I could really come up with is to understand your formulas and how they work together. Know why things worked out how it did and understand the problems.
- Know your graphs and how they work. Graphs hold all the answers if you know how to manipulate the information it gives you.
- Many things have helped me in Calculus. Paying attention in class; doing homework problems immediately after class; taking decent notes; talking to other students if I need help. A couple things have not worked for me. Doing problems five minutes before class; missing class and attempting to catch up. The only thing I wish past students had told me is “Do not be afraid to approach the teacher if you have problems”

I expect that by the first day of school you will have an **organized notebook** along with all **necessary supplies**.

There are certain math skills that have been taught to you over the previous years that are necessary to be successful in calculus. Often, the difficulty in calculus is not calculus concepts but because of the algebra or trigonometry behind it. Therefore, I have included **two homework assignments** that are due on the first day of school. Regarding the homework assignments, don't fake your way through any of these problems because you will need to understand everything in it very well. You may work with someone else while you do this, but copying will not be tolerated. Also, don't wait until the last minute to do everything in the packet because you may run out of time and rush through them. Likewise, do not do all the problems right at the beginning of summer and completely forget how to do all of them by the time school starts again. Remember, there will be an assessment during the first or second week of class based on the homework assignment.

Have a wonderful and relaxing summer. I am looking forward to delving into the study and exploration of a branch of mathematics which my college Calculus book refers to as “one of the supreme accomplishments of the human intellect.” Calculus truly is a fascinating course, and together we will appreciate its complexities, eloquence, and problem solving capabilities.

“The essence of essence of mathematics is not to make simple things complicated, but to make complicated things simple.”

~S. Gudder

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Calculus First Day Checklist

Materials

The following materials are required for AP Calculus. Please have these materials by the first day of school so we are able to get started right away!

- Flash Drive (4G min) – can be shared with other classes
- TI-83+ or TI-84 Graphing calculator (recommended but not required)
- 3-Ring binder with dividers (at least 2 inches thick)
- 4-6 Pocket Dividers (plastic ones hold up the best)
- Pencils (Class work and Homework)
- Pens (**RED**, black and blue)
- Paper (lined)
- Several packets of Graph Paper (or several graphing notebooks)
- Highlighter

Binder

Your binder should have the following sections

- Drill Sheets
- Class Notes
- Handouts
- Homework
- Assessments/Projects (Graded)
- Free Response
- Reference Material
- Keep It (random things that you will be told are important to keep for review)

Khan Academy (Homework Assignment)

Level 1

Note: Khan Academy assignments

MC Homework Assignment

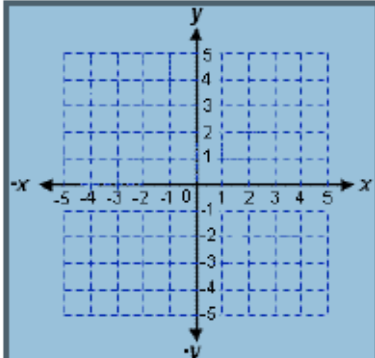
Remember, don't fake your way through any of these problems because you will need to understand everything in it very well.

Assessment 1

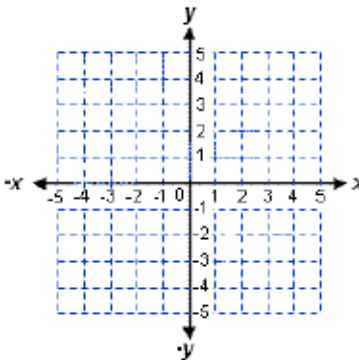
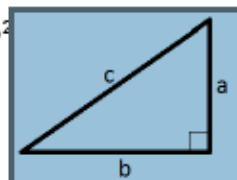
An assessment will be given during the first or second week of class based on the summer assignments.

Part 1 – Study Guide and Reference Section

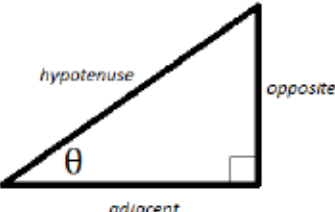
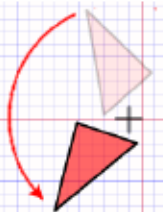
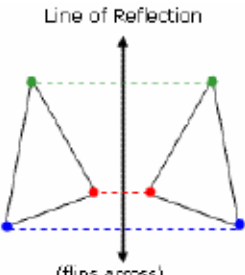
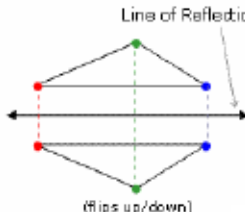
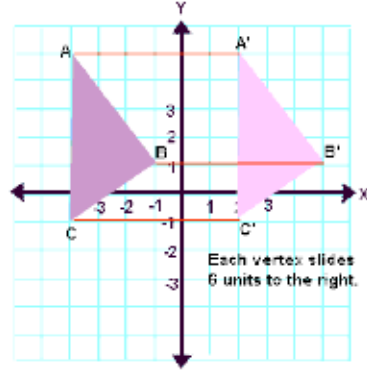
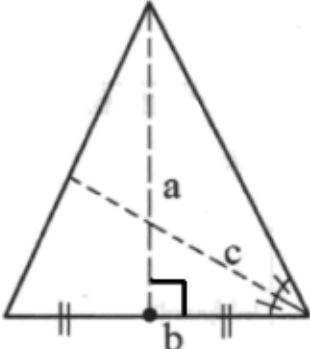
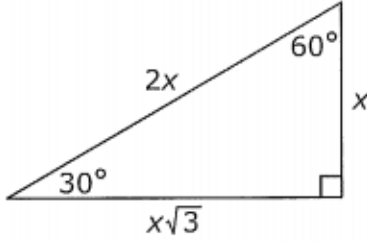
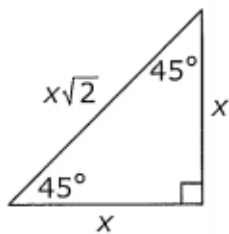
Stuff You Must Know Cold from Algebra

<p><u>Powers of 2</u></p> $2^2 = 4$ $2^3 = 8$ $2^4 = 16$ $2^5 = 32$ $2^6 = 64$ $2^7 = 128$ $2^8 = 256$ $2^9 = 512$ $2^{10} = 1024$ $2^{11} = 2048$ $2^{12} = 4096$	$19^2 = 361$ $20^2 = 400$ $21^2 = 441$ $22^2 = 484$ $23^2 = 529$ $24^2 = 576$ $25^2 = 625$	<p><u>Inequality Meanings</u></p> $<$ <i>less than</i> \leq <i>less than or equal to</i> $>$ <i>greater than</i> \geq <i>greater than or equal to</i>
<p><u>Squares</u></p> $3^2 = 9$ $4^2 = 16$ $5^2 = 25$ $6^2 = 36$ $7^2 = 49$ $8^2 = 64$ $9^2 = 81$ $10^2 = 100$ $11^2 = 121$ $12^2 = 144$ $13^2 = 169$ $14^2 = 196$ $15^2 = 225$ $16^2 = 256$ $17^2 = 289$ $18^2 = 324$	<p><u>Cubes</u></p> $3^3 = 27$ $4^3 = 64$ $5^3 = 125$ $6^3 = 216$ $7^3 = 343$ $8^3 = 512$ $9^3 = 729$ $10^3 = 1000$ $11^3 = 1331$ $12^3 = 1728$	<p><u>Linear Equations</u></p> <p>Parent Function: $y = x$</p> <p>Standard Form: $ax + by = c$</p> <p>Slope-Intercept Form: $y = mx + b$</p> <p>Point-Slope Form: $y - y_1 = m(x - x_1)$</p> <p>Slope: $\frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$</p> <p>Graph: $y =$ (label 3 points)</p>
	<p><u>Factorials</u></p> $0! = 1$ $1! = 1$ $2! = 2$ $3! = 6$ $4! = 24$ $5! = 120$	

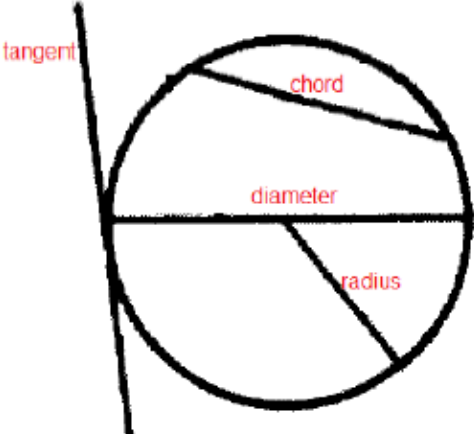
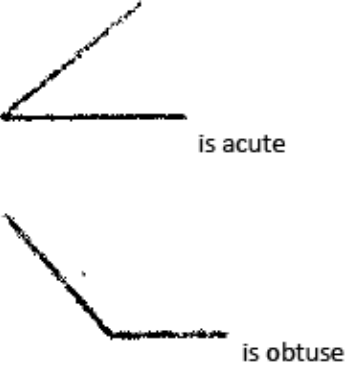
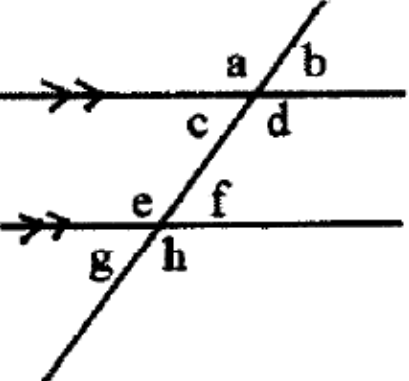
Stuff You Must Know Cold from Algebra

<p><u>Quadratic Equations</u></p> <p>Parent Function: $y = x^2$</p> <p>Standard Form (Vertex Form): $y = a(x - h)^2 + k$</p> <p>General Form: $y = ax^2 + bx + c$</p> <p>Vertex: (h, k)</p> <p>Axis of Symmetry: $x = \frac{-b}{2a}$</p> <p>Quadratic Formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$</p> <p>Graph: $y =$ (label 3 points)</p> 	<p><u>Order of Operations</u></p> <ol style="list-style-type: none"> 1. Brackets 2. Exponents 3. Multiply & Divide (left to right) 4. Add & Subtract (left to right) <p><u>Function Definitions</u></p> <p>Domain: <i>The set of all possible input values (usually x)</i></p> <p>Range: <i>The set of all possible output values (usually y)</i></p> <p>Function: <i>A relation where each element in the domain (x) matches with exactly one element of the range (y)</i></p> <p>Direct Variation: $y = kx$</p> <p>Indirect Variation: $y = \frac{k}{x}$</p> <p>Roots: <i>The x-intercepts of a function, where the function (y) equals zero. Roots are also known as solutions, zeros, and x-intercepts.</i></p>	<p><u>Midpoint Formula</u></p> <p>$(m_1, m_2) =$ $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$</p> <p>Use a, b, and c to describe the following properties:</p> <p><u>Commutative Property</u></p> <p>Addition: $a + b = b + a$</p> <p>Multiplication: $a \cdot b = b \cdot a$</p> <p><u>Associative Property</u></p> <p>Addition: $a + (b + c) = (a + b) + c$</p> <p>Multiplication: $a \cdot (b \cdot c) = (a \cdot b) \cdot c$</p> <p><u>Distributive Property</u></p> <p>$a(b + c) = ab + ac$</p>
<p><u>Absolute Value</u></p> <p>$a \geq 0$</p> <p>$a = a$</p> <p>$-a = a$</p>	<p><u>Distance Formula</u></p> <p>$d = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$</p>	<p><u>Pythagorean Theorem</u></p> <p>$c^2 = a^2 + b^2$</p> 

Stuff You Must Know Cold from Geometry

<p><u>Trigonometric Ratios</u></p> $\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$ $\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ $\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$ 	<p><u>Triangle Congruence</u></p> <ol style="list-style-type: none"> 1. Side-Side-Side (SSS) 2. Side-Angle-Side (SAS) 3. Angle-Side-Angle (ASA) 4. Angle-Angle-Side (AAS) 5. Hypotenuse-Leg (HL) <p>http://www.mathopenref.com/congruenttriangles.html</p>	<p><u>Transformations</u></p> <ol style="list-style-type: none"> 1. <u>Rotation</u>  <ol style="list-style-type: none"> 2. <u>Horizontal Reflection</u> <p>Line of Reflection</p>  <p>(flips across)</p> <ol style="list-style-type: none"> 3. <u>Vertical Reflection</u> <p>Line of Reflection</p>  <p>(flips up/down)</p> <ol style="list-style-type: none"> 4. <u>Translation</u>  <p>Each vertex slides 6 units to the right.</p>
<p><u>Parts of a Triangle</u></p>  <p>a: altitude (height) b: base (with midpoint) c: angle bisector</p>	<p><u>Special Right Triangles</u></p> <p>30° - 60° - 90° triangle</p>  <p>45° - 45° - 90° triangle</p> 	
<p><u>Similarity</u></p> <p>Ratio of Sides: $m:n$</p> <p>Ratio of Perimeters: $m:n$</p> <p>Ratio of Areas: $m^2:n^2$</p> <p>Ratio of Volumes: $m^3:n^3$</p>		

Stuff You Must Know Cold from Geometry

<p><u>Perimeter Formulas</u></p> <p>Square: $P = 4s$</p> <p>Rectangle: $P = 2l + 2w$</p> <p>Circumference: $C = \pi r^2$</p>	<p><u>Roots to Know</u></p> <p>$\sqrt{2} \approx 1.41$</p> <p>$\sqrt{3} \approx 1.73$</p>	
<p><u>Area Formulas</u></p> <p>Square: $A = s^2$</p> <p>Rectangle: $A = l \cdot w$</p> <p>Parallelogram: $A = b \cdot h$</p> <p>Trapezoid: $A = \frac{1}{2}(b_1 + b_2)h$</p> <p>Circle: $A = \pi r^2$</p> <p>Triangle: $A = \frac{1}{2}b \cdot h$</p> <p>Regular Polygon: $A = \frac{1}{2}a \cdot p$</p>	<p><u>Parts of a Circle</u></p> 	
<p><u>Surface Area Formulas</u></p> <p>Cube: $S = 6s^2$</p> <p>Sphere: $S = 4\pi r^2$</p> <p>Cylinder: $S = 2B + Ch$</p>	<p><u>Types of Angles:</u></p> 	<p>Complementary angles add up equal <u>90°</u>.</p> <p>Supplementary angles add up equal <u>180°</u>.</p>
<p><u>Volume Formulas</u></p> <p>Cube: $V = s^3$</p> <p>Prism/Cylinder: $V = B \cdot h$</p> <p>Pyramid/Cone: $V = \frac{1}{3}B \cdot h$</p> <p>Sphere: $V = \frac{4}{3}\pi r^3$</p>	<p><u>Sum of Interior Angles</u></p> <p>Triangle = 180°</p> <p>Quadrilateral = 360°</p> <p>Regular Polygon = 180° (n-2)</p>  <p>Angle <i>a</i> is congruent to: <u>Angles <i>d</i>, <i>e</i>, and <i>h</i></u></p> <p>Angle <i>a</i> is supplementary to: <u>Angles <i>b</i>, <i>c</i>, <i>f</i>, and <i>g</i></u></p>	

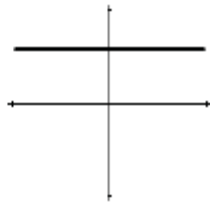


Toolkit of Functions

Students should know the basic shape of these functions and be able to graph their transformations without the assistance of a calculator.

Constant

$$f(x) = a$$



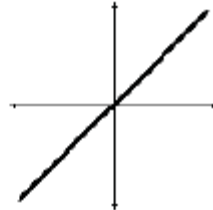
Cubic

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



Identity

$$f(x) = x$$



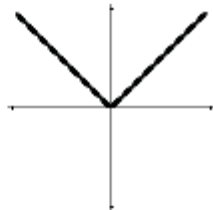
Square Root

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



Absolute Value

$$f(x) = |x|$$



Greatest Integer

$$f(x) = [x]$$



Reciprocal

$$f(x) = \frac{1}{x}$$



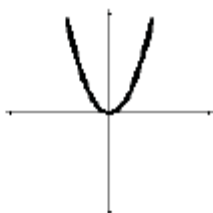
Exponential

$$f(x) = a^x$$



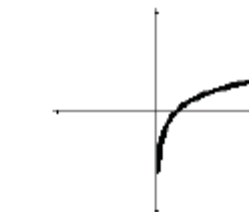
Quadratic

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



Logarithmic

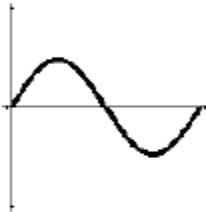
$$f(x) = \ln x$$



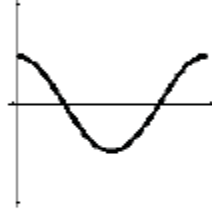


Trig Functions

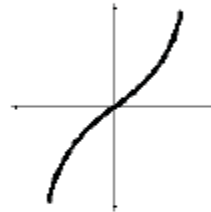
$$f(x) = \sin x$$



$$f(x) = \cos x$$



$$f(x) = \tan x$$



Polynomial Functions:

A function P is called a polynomial if $P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_2 x^2 + a_1 x + a_0$

Where n is a nonnegative integer and the numbers $a_0, a_1, a_2, \dots, a_n$ are constants.

Even degree

Odd degree

Leading coefficient sign

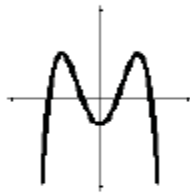
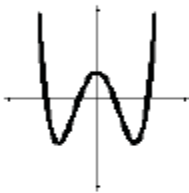
Leading coefficient sign

Positive

Negative

Positive

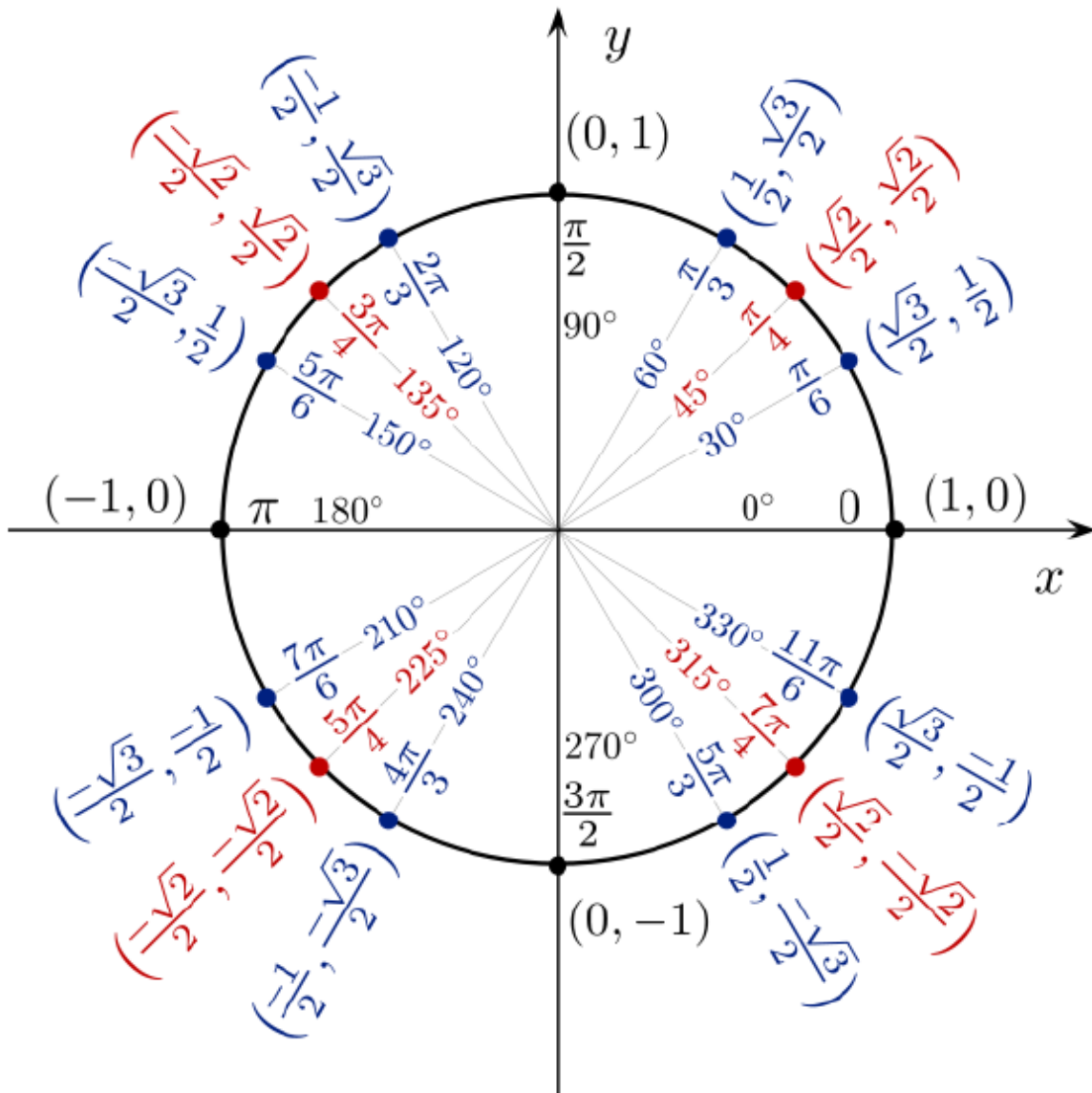
Negative



- Number of roots equals the degree of the polynomial.
- Number of x intercepts is less than or equal to the degree.
- Number of "turns" is less than or equal to $(\text{degree} - 1)$.

Unit Circle

You must be able to use the unit circle... from memory!



Part 2 – KHAN Academy



How to join your teacher's Khan Academy class

1. Sign up at **khanacademy.org**
(or log in if you already have an account).
2. Visit **khanacademy.org/coaches**
(the “Coaches” tab in your profile).
3. In the “Add a coach” field, enter the class code.
Class code:
4. You're set. Now click **Home** to start learning!

Complete ALGEBRA II Mission Foundation Skills as Level 1(Khan Academy) Recommended Pacing: Two – Three Topics per Week

- Functions
- Arithmetic with polynomials
- Polynomials
- Radical relationships
- Rational relationships
- Exponential growth & decay
- Exponentials & logarithms
- Trigonometry
- Advanced equations & functions

Part 3 –Calculus MC Homework Assignments

Do not do the following problems: 12, 46, and 47.

Be sure to have your work available.

AP Calculus AB Summer Packet

Name: _____

AP Calculus AB Summer Packet Answer Sheet

- | | | |
|-----------|-----------|-----------|
| 1. _____ | 21. _____ | 41. _____ |
| 2. _____ | 22. _____ | 42. _____ |
| 3. _____ | 23. _____ | 43. _____ |
| 4. _____ | 24. _____ | 44. _____ |
| 5. _____ | 25. _____ | 45. _____ |
| 6. _____ | 26. _____ | 46. _____ |
| 7. _____ | 27. _____ | 47. _____ |
| 8. _____ | 28. _____ | 48. _____ |
| 9. _____ | 29. _____ | 49. _____ |
| 10. _____ | 30. _____ | 50. _____ |
| 11. _____ | 31. _____ | 51. _____ |
| 12. _____ | 32. _____ | 52. _____ |
| 13. _____ | 33. _____ | 53. _____ |
| 14. _____ | 34. _____ | 54. _____ |
| 15. _____ | 35. _____ | 55. _____ |
| 16. _____ | 36. _____ | 56. _____ |
| 17. _____ | 37. _____ | 57. _____ |
| 18. _____ | 38. _____ | 58. _____ |
| 19. _____ | 39. _____ | 59. _____ |
| 20. _____ | 40. _____ | 60. _____ |
-

AP Calculus AB Summer Packet 2018

Directions: Identify the choice that best completes the statement or answers the question. Write your answers on the answer sheet that has been provided in this packet.

1. Simplify: $(19x^{-6}y^{11})(-6xy^5)$

a. $-114x^{-5}y^{16}$

c. $\frac{-114y^{16}}{x^5}$

b. $\frac{13y^{16}}{x^5}$

d. $-114x^{-7}y^{-24}$

2. Simplify: $\frac{4}{16 + \sqrt{11}}$

a. $\frac{64 + 4\sqrt{11}}{-245}$

c. $\frac{16 - \sqrt{11}}{245}$

b. $\frac{64 + 4\sqrt{11}}{245}$

d. $\frac{64 - 4\sqrt{11}}{245}$

3. Simplify: $y^{\frac{2}{11}}y^{\frac{4}{11}}$

a. $y^{\frac{2}{11}}$

c. $y^{\frac{12}{11}}$

b. $y^{\frac{6}{11}}$

d. $y^{\frac{8}{11}}$

4. Simplify: $\frac{3}{4x^2 - 25} + \frac{2}{2x + 5}$

a. $\frac{4x + 7}{(2x + 5)(2x - 5)}$

c. $\frac{4x - 7}{(2x + 5)(2x - 5)}$

b. $\frac{4x - 10}{(2x - 5)(2x + 5)}$

d. $\frac{5}{(4x^2 + 2x - 20)}$

AP Calculus AB Summer Packet 2018

5. Simplify: $\frac{8}{y+2} - \frac{3y}{y^2-4}$

a. $\frac{5y-16}{(y+2)(y-2)}$

c. $\frac{5y-16}{(y+2)(y^2-4)}$

b. $\frac{8-3y}{(y+2)(y^2-4)}$

d. $\frac{5y+16}{(y+2)(y-2)}$

6. Factor Completely: $30x^3 - 50x^2 + 27x - 45$

a. $10x^2(3x-5) - 9(3x-5)$

c. $10x^2(3x-5) - 27x + 45$

b. $(10x^2+9)(3x-5)$

d. $(30x^3 - 50x^2) + (27x - 45)$

7. Factor Completely: $4x^2 - 13x + 9$

a. $4x^2 - 4x - 9x + 9$

c. $4x(x-1) - 9(x-1)$

b. $4x^2 - 3x - 10x + 9$

d. $(4x-9)(x-1)$

8. Simplify: $\frac{30x^2 + 53x + 22}{70x^2 + 17x - 66}$ Assume that no denominator is equal to 0.

a. $\frac{3x-2}{7x+6}$

c. $\frac{3x+2}{7x-6}$

b. $\frac{3x-2}{7x-6}$

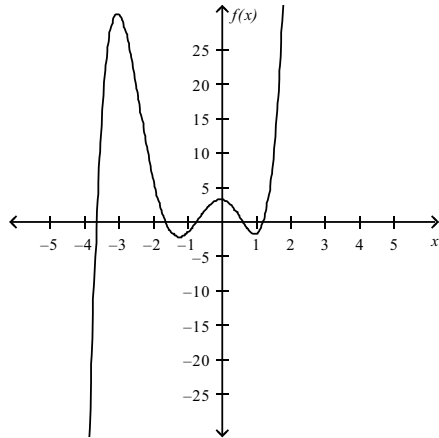
d. $\frac{3x+2}{7x+6}$

AP Calculus AB Summer Packet 2018

For the given graph,

- a. describe the end behavior,
- b. determine whether it represents an odd-degree or even-degree polynomial function, and
- c. state the number of real zeros.

9.



- a. The end behavior of the graph is $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$ and $f(x) \rightarrow +\infty$ as $x \rightarrow -\infty$.
It is an odd-degree polynomial function.
The function has five real zeros.
 - b. The end behavior of the graph is $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$ and $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$.
It is an odd-degree polynomial function.
The function has five real zeros.
 - c. The end behavior of the graph is $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$ and $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$.
It is an odd-degree polynomial function.
The function has four real zeros.
 - d. The end behavior of the graph is $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$ and $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$.
It is an even-degree polynomial function.
The function has five real zeros.
-

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10. For the given values, determine consecutive values of x between which each real zero is located.

$$f(x) = -2x^4 - 4x^3 - 2x^2 + 3x + 8$$

- There is a zero between $x = 1$ and $x = 2$.
- There are zeros between $x = 2$ and $x = 3$, $x = 1$ and $x = 0$, $x = -2$ and $x = -3$.
- There are zeros between $x = 1$ and $x = 2$, $x = -1$ and $x = -2$.
- There is a zero between $x = -1$ and $x = -2$.

11. Estimate the x -coordinates at which the relative maxima and relative minima occur for the function. $f(x) = 8x^3 + 2x^2 - 8$

- The relative maximum is at $x = -0.17$, and the relative minimum is at $x = 1$.
- The relative maximum is at $x = 0.17$, and the relative minimum is at $x = 0$.
- The relative maximum is at $x = 0.17$, and the relative minimum is at $x = 1$.
- The relative maximum is at $x = -0.17$, and the relative minimum is at $x = 0$.

12. Find all of the zeros of the function $f(x) = x^3 - 15x^2 + 73x - 111$.

- | | |
|----------------------|-----------------------|
| a. $3, 6 - i, 6 + i$ | c. $3, 6 - i$ |
| b. $6 - i, 6 + i$ | d. $-3, 6 - i, 6 + i$ |

13. Find the inverse of the given function: $f(x) = \frac{7x-3}{16}$

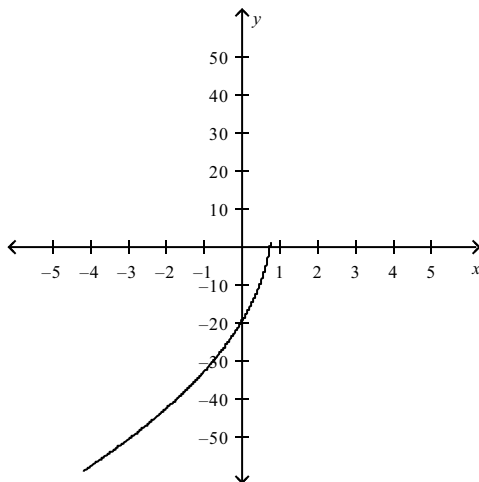
- | | |
|----------------------------------|----------------------------------|
| a. $f^{-1}(x) = \frac{16x-3}{7}$ | c. $f^{-1}(x) = \frac{7x+16}{3}$ |
| b. $f^{-1}(x) = \frac{16x+3}{7}$ | d. $f^{-1}(x) = \frac{7x-16}{3}$ |
-
-

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14. Graph the given function. State its domain and range.

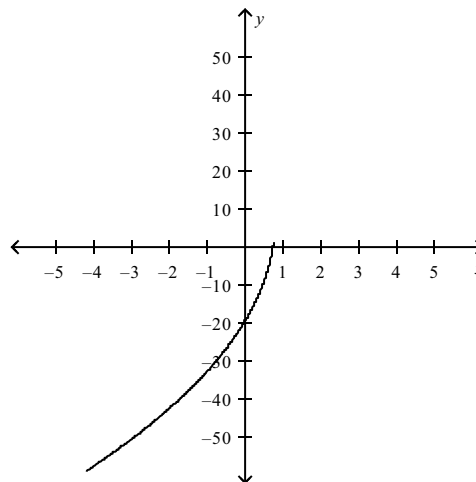
$$y = -12\sqrt{5 - 6x} + 6$$

a.



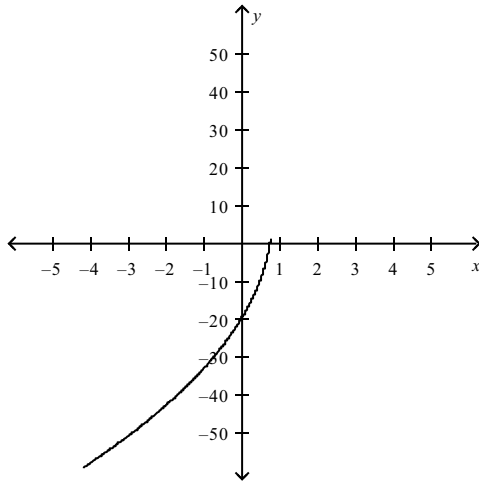
The domain is $x \leq \frac{5}{6}$ and the range is $y \leq 6$.

c.



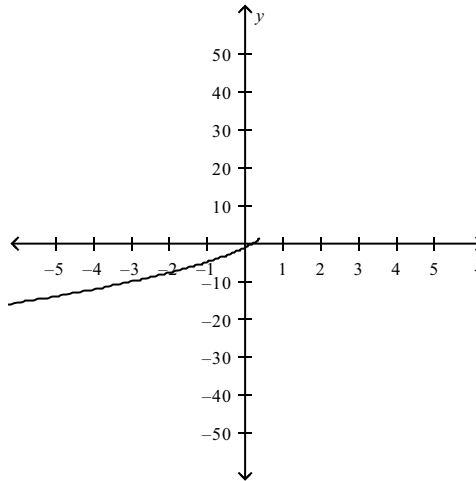
The domain is $x \geq \frac{5}{6}$ and the range is $y \geq 6$.

b.



The domain is $x \leq \frac{5}{6}$ and the range is $y \geq 6$.

d.



The domain is $x \leq \frac{5}{6}$ and the range is $y \geq 6$.

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18. Find the domain of the function: $f(x) = \frac{x^2 - 9x + 20}{x^2 - 4x + 3}$

a. All real numbers $x \neq 3, 1$

c. All real numbers $x \neq -3, -1$

b. All real numbers $x \neq -5, -4$

d. All real numbers $x \neq 5, 4$

19. Find the domain of the function: $f(x) = \sqrt{-2x - 4}$

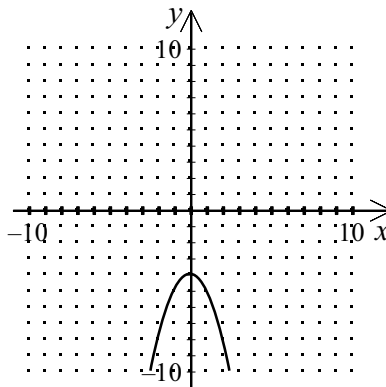
a. $x \geq 0$

c. $x \geq -2$

b. $x \leq -2$

d. $x \leq 0$

20. Find the domain of the function graphed below: $f(x) = -x^2 - 4$



[A] Domain: $(-\infty, \infty)$; Range: $-4, \infty)$

[C] Domain: $(-\infty, \infty)$; Range: $(-\infty, -4$

[B] Domain: $(-\infty, \infty)$; Range: $(-\infty, \infty)$

[D] Domain: $(-\infty, \infty)$; Range: $(-4, \infty)$

21. Find the vertical asymptote(s), if any, for $f(x) = \frac{3x - 7}{x^2 - 5x + 6}$.

[A] $x = 7, x = 2$

[C] $x = 2, x = 3$

[B] $x = 2, x = 3, x = 7$

[D] No vertical asymptotes

22. Determine if the graph of the rational function has a slant asymptote. If it does, find the equation of the slant asymptote.

$$f(x) = \frac{2x^2 + x^2 - 6x + 2}{x^4 - x - 2}$$

a. $y = 2x$

c. $y = 2x + 3$

b. $y = 2x - 3$

d. No slant asymptote

23. Find the horizontal asymptotes, if any, of the graph of $f(x) = \frac{2x^2 + 8}{3x^2 + 4x - 1}$.

a. $y = \frac{2}{3}$

c. $y = 0$

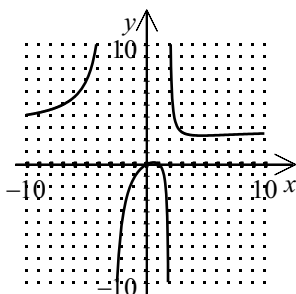
b. $y = -8$

d. No horizontal asymptotes

24. Sketch the graph of the rational function. Find any vertical and horizontal asymptotes.

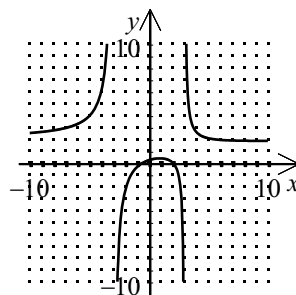
$$f(x) = \frac{2x^2 - 5x - 3}{x^2 - 4}$$

a.



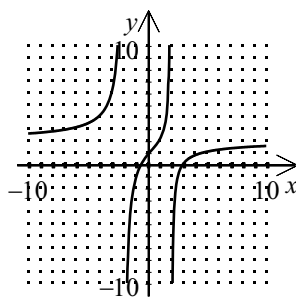
Asymptotes: $x = -3$, $x = 2$, $y = 3$

c.



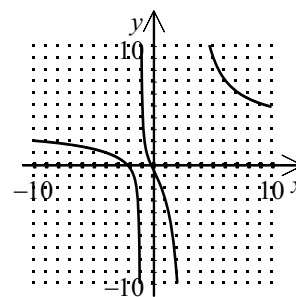
Asymptotes: $x = -3$, $x = 3$, $y = 2$

b.



Asymptotes: $x = -2$, $x = 2$, $y = 2$

d.



Asymptotes: $x = -1$, $x = 3$, $y = 3$

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25. Find $f(x+h)$, $f(x+h)-f(x)$, and $\frac{f(x+h)-f(x)}{h}$ for the function $f(x) = \frac{2}{x+1}$.

a. $\frac{2}{xh+1}$, $\frac{-2xh}{(x-h-1)(x-1)}$, $\frac{-2}{(x+h+1)(x+1)}$

b. $\frac{2}{x+h+1}$, $\frac{-2xh}{(x-h-1)(x-1)}$, $\frac{2}{(x-h-1)(x+2)}$

c. $\frac{2}{xh+1}$, $\frac{-2h}{(x+h+1)(x-1)}$, $\frac{2}{(x-h-1)(x+2)}$

d. $\frac{2}{x+h+1}$, $\frac{-2h}{(x+h+1)(x-1)}$, $\frac{-2}{(x+h+1)(x+1)}$

26. Evaluate the expression: $\ln e^2$.

- | | |
|----------|--------------|
| a. e^2 | c. $\ln 2^e$ |
| b. 2^e | d. 2 |

27. Evaluate the expression : $e^{\ln 14}$.

- | | |
|---------------|----------------|
| a. $\ln 14^e$ | c. \ln^{e14} |
| b. 14 | d. e^{14} |

28. Solve the given equation. Round to the nearest ten-thousandth, if necessary.

$$10 + 5e^{2x} = 17$$

- | | |
|-----------|-----------|
| a. 1.4 | c. 0.5666 |
| b. 0.6592 | d. 0.1682 |
-

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34. Find the coordinates of the point of intersection of a -240° angle and the unit circle.

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

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

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

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

35. Use the period of the trigonometric function $\sin\frac{3\pi}{2}$ to evaluate the function.

a. $-\frac{\sqrt{2}}{2}$

c. $\frac{\sqrt{2}}{2}$

b. -1

d. 0

36. If possible, evaluate the expression without the aid of a calculator.

$$\sin^{-1}(-1)$$

a. $-\frac{\pi}{2}$

c. $-\frac{\pi}{4}$

b. $-\frac{\pi}{3}$

d. Not possible

37. Evaluate the expression without the aid of a calculator.

$$\arcsin 0$$

a. $\frac{\pi}{2}$

c. 0

b. $\frac{\pi}{4}$

d. π

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38. Use a calculator to approximate the expression.

$$\arctan(-0.67)$$

a. -0.5903

c. -1.2622

b. -85.5122

d. -0.0117

39. Simplify: $\tan\left(\arcsin \frac{1}{2}\right)$

a. 2

c. $\frac{\sqrt{3}}{2}$

b. $\sqrt{3}$

d. $\frac{\sqrt{3}}{3}$

40. Factor the expression and use the fundamental identities to simplify.

$$\cos^2 x \sec^2 x - \cos^2 x$$

a. $\cos^2 x \cot^2 x$

c. 1

b. $\cos^2 x$

d. $\sin^2 x$

41. Find the expression that completes the identity: $\frac{1 - \cos u}{\sin u} + \frac{\sin u}{1 - \cos u} =$

a. $2\csc u$

c. $2\sin u$

b. 0

d. $2 + \cos u$

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42. Find the x-values that are solutions of the equation: $5\cot^2 x - 15 = 0$

a. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

c. $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

b. $\frac{\pi}{4}, \frac{\pi}{2}, \frac{2\pi}{3}, \frac{5\pi}{6}$

d. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

43. Find the x-values that are solutions of the equation: $8\cos x - 4\sqrt{3} = 0$

a. $\frac{\pi}{6}, \frac{11\pi}{6}$

c. $\frac{7\pi}{6}, \frac{11\pi}{6}$

b. $\frac{5\pi}{6}, \frac{7\pi}{6}$

d. $\frac{\pi}{6}, \frac{7\pi}{6}$

44. Find all the solution of the equation in the interval $[0, 2\pi)$: $4\cos 3x - 2\sqrt{3} = 0$

a. $\frac{\pi}{18}, \frac{11\pi}{18}, \frac{13\pi}{18}, \frac{23\pi}{18}, \frac{25\pi}{18}$

b. $\frac{\pi}{18}, \frac{11\pi}{18}, \frac{2\pi}{3}, \frac{13\pi}{18}, \frac{23\pi}{18}, \frac{25\pi}{18}, \frac{35\pi}{18}$

c. $\frac{\pi}{18}, \frac{11\pi}{18}, \frac{13\pi}{18}, \frac{23\pi}{18}, \frac{25\pi}{18}, \frac{35\pi}{18}$

d. $\frac{\pi}{18}, \frac{13\pi}{18}$

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45. Find all solutions of $\sin 2x - \frac{\sqrt{2}}{2} = 0$.

a. $\frac{\pi}{8} + n\pi, \frac{3\pi}{8} + n$

c. $\pm \frac{\pi}{3} + n\pi$

b. $\frac{\pi}{8} + 2n\pi, \frac{3\pi}{8} + 2n$

d. $\pm \frac{\pi}{3} + 2n\pi$

46. Classify the conic represented by the equation $x^2 + 11xy - 19y^2 + 2x + 8y + 22 = 0$.

a. parabola

c. ellipse or circle

b. hyperbola

d. none of these

47. Find an equation that represents a parabola.

a. $5y^2 + 6x - 2y = -11$

c. $5x^2 + 6x + 10y^2 - 2y = -2$

b. $2x^2 + 6x + 2y^2 + 5y - 2 = 0$

d. $-2y^2 + 6y + 2x^2 + 2x + 5 = 0$

48. Divide $(8x^4 - 20x^3 - 14x^2 + 8x + 1)$ by $(x + 1)$ using synthetic division.

a. $8x^3 + 28x^2 - 14x + \frac{11}{x+1}$

c. $8x^3 - 28x^2 + 14x - 6 + \frac{7}{x+1}$

b. $8x^3 + 36x^2 + 18x + 10 + \frac{11}{x+1}$

d. $8x^3 + 28x^2 - 14x + 8$

49. Which equation represents a line through $(-1, 1)$ with a slope of $\frac{2}{3}$?

a. $y - 1 = \frac{2}{3}(x + 1)$

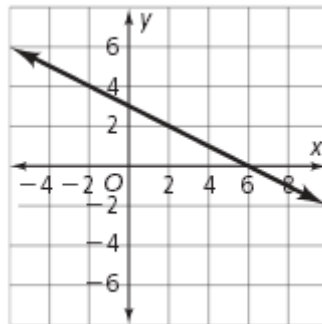
c. $y - 1 = \frac{2}{3}(x - 1)$

b. $y + 1 = \frac{2}{3}(x - 1)$

d. $y + 1 = \frac{2}{3}(x + 1)$

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50. Which of the following equations is shown in the graph below?



- a. $y + 2 = -\frac{1}{2}(x + 2)$ c. $y - 3 = -\frac{1}{2}(x - 6)$
b. $y + 3 = -\frac{1}{2}(x + 6)$ d. $y - 2 = -\frac{1}{2}(x - 2)$

51. Which of the following systems of equations has the solution $(4, -1)$?

- a. $\begin{cases} 3x - 2y = 14 \\ 2x + 2y = 6 \end{cases}$ c. $\begin{cases} -2x + 4y = 6 \\ -3x + 6y = 8 \end{cases}$
b. $\begin{cases} 3x - y = 0 \\ 4x + 3y = 26 \end{cases}$ d. $\begin{cases} 4x + 9y = 1 \\ 4x + 6y = -2 \end{cases}$

52. What function has a graph with a removable discontinuity at $(5, \frac{1}{9})$?

- a. $y = \frac{(x-5)}{(x+4)(x-5)}$ c. $y = \frac{4x-1}{5x+1}$
b. $y = \frac{4}{x-5}$ d. $y = \frac{x+1}{5x-4}$
-

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53. Which expression equals $\frac{\frac{2}{m}+6}{\frac{1}{n}}$

a. $\frac{12n}{m}$

c. $\frac{6m+2}{mn}$

b. $\frac{2n+6mn}{m}$

d. $\frac{m}{2n+6mn}$

54. Write $12^{\frac{1}{3}} \cdot 45^{\frac{1}{3}} \cdot 50^{\frac{1}{3}}$ in simplest form.

a. $\sqrt{27,000}$

c. $107^{\frac{1}{3}}$

b. 30

d. 27,000

55. What is $(-32x^{10}y^{35})^{-\frac{1}{5}}$ in simplest form?

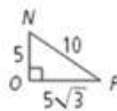
a. $2x^2y^7$

b. $-\frac{2}{x^2y^7}$

c. $-\frac{1}{2x^2y^7}$

d. $\frac{2}{x^2y^7}$

56. What is the value of $\sin N$?



a. $\frac{1}{2}$

c. $\frac{\sqrt{3}}{3}$

b. $\frac{\sqrt{3}}{2}$

d. $\sqrt{3}$



57. What is the value of x to the nearest degree?

- a. 18
- b. 19
- c. 71
- d. 72

58. Factor completely: $16x^2 - 8x + 1$

- a. $(4x + 1)(4x - 1)$
- b. $(8x + 1)(8x - 1)$
- c. $(4x - 1)^2$
- d. $(4x + 1)^2$

59. Factor completely: $36x^2 - 100y^2$

- a. $(6x + 10y)(6x - 10y)$
- b. $2(18x^2 - 50y^2)$
- c. $4(3x + 5y)(3x + 5y)$
- d. $4(3x + 5y)(3x - 5y)$

60. Factor completely: $8x^3 - 27$

- a. $(2x - 3)(2x^2 - 6x - 3)$
 - b. $(2x - 3)(4x^2 + 6x + 9)$
 - c. $(2x + 3)(2x^2 + 6x - 3)$
 - d. $(2x + 3)(4x^2 + 6x + 9)$
-

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Directions: Match the functions with the graphs and then write the domain and range under each graph.

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

_____ 2. $y = e^x$

_____ 3. $y = x^3$

_____ 4. $y = |x|$

_____ 5. $y = \sqrt{x}$

_____ 6. $y = c$

_____ 7. $y = x$

_____ 8. $y = \frac{1}{x^2}$

_____ 9. $y = \ln x$

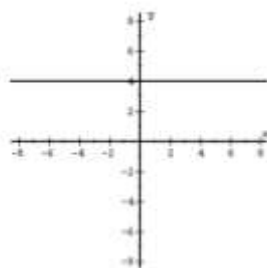
_____ 10. $y = x^2$

_____ 11. $y = \sin x$

_____ 12. $y = \cos x$

_____ 13. $y = \tan x$

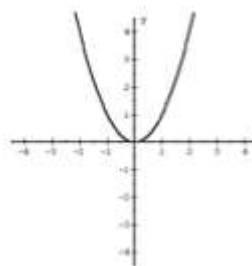
_____ 14. $y = \lceil x \rceil$



A.

Domain:

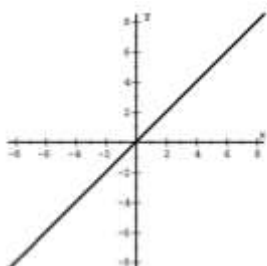
Range:



C.

Domain:

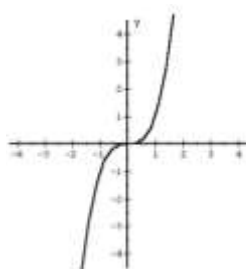
Range:



B.

Domain:

Range:

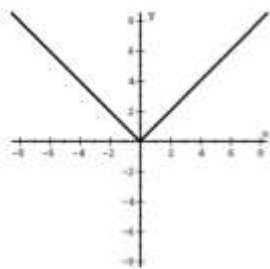


D.

Domain:

Range:

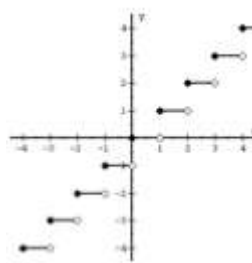
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E.

Domain:

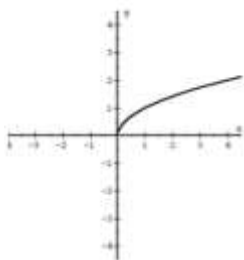
Range:



H.

Domain:

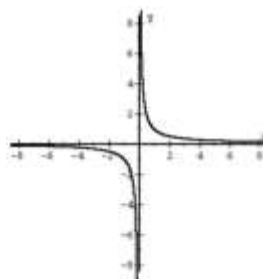
Range:



F.

Domain:

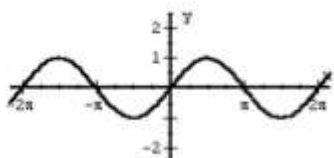
Range:



I.

Domain:

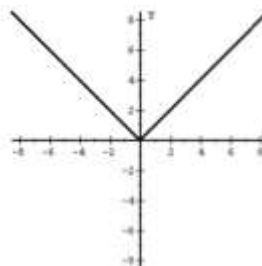
Range:



G.

Domain:

Range:

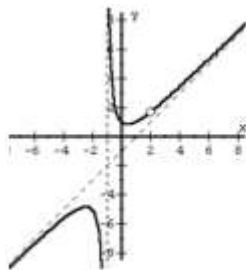


J.

Domain:

Range:

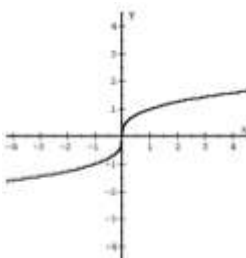
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K.

Domain:

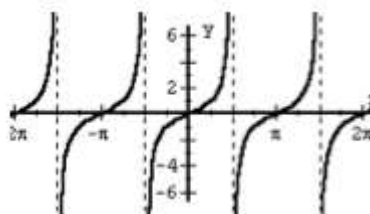
Range:



L.

Domain:

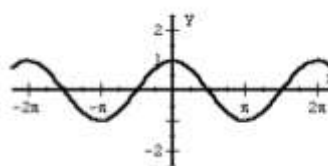
Range:



M.

Domain:

Range:



N.

Domain:

Range: