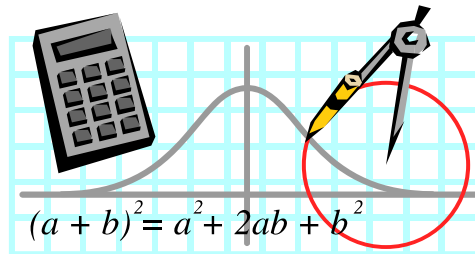


AP Calculus AB

Summer Packet



Welcome to AP Calculus AB! You will have an exciting year studying limits, derivatives and integrals. One of the primary goals of the Advanced Placement Calculus program set forth by the College Board is to develop your understanding of calculus concepts and provide experience with its methods and applications. To achieve this goal, you will study calculus using a multirepresentational approach: geometrically, numerically, analytically and verbally. These approaches will be learned and performed with and without the use of a graphing calculator.

As with any math course, mastery of the prerequisite knowledge is essential to success in subsequent math courses. Prior to enrolling in AP Calculus AB, you are expected to have studied and mastered the concepts and their applications from algebra, geometry, trigonometry, analytic geometry and elementary functions. These functions include those that are linear, polynomial, rational, exponential, logarithmic, trigonometric, inverse trigonometric and piecewise. In particular, before studying calculus, you must be familiar with the properties of functions, the algebra of functions, and the graphs of functions. You must also understand the language of functions (domain, range, odd and even, periodic, symmetry, zeros, intercepts and so on) and know the values of the trigonometric functions of common angles such as 0 , $\frac{\pi}{6}$, $\frac{\pi}{4}$, $\frac{\pi}{3}$, and $\frac{\pi}{2}$.

Your AP Calculus Exam is scheduled for Wednesday, May 5th 2010. Yes, that seems like a long ways off but May rolls around faster than you think. With so much calculus to learn prior to this date, we do not have the luxury of spending the first quarter of the 09-10 school year reviewing the prerequisite topics. This summer packet has been designed and provided to help you stay “fresh” on the essential knowledge to get us started quickly in September. The Summer Packet is comprised of a review of parent functions and a collection of mathematics problems for you to solve. You are expected to have completed the summer packet in its entirety by the first day of class. It will be collected and assigned a grade. Activities the first week of class will also require the completion of this packet. You are encouraged to search the web for assistance and collaborate with your future Calculus AB classmates. Remember, this packet is meant to help you refresh the topics and skills that you will need to call upon on a daily basis as we learn and perform calculus. It would be best to start this packet no earlier than August so the topics will be fresh in your mind when we start class in the fall. Do not wait until the night before school starts to complete; this packet takes time. Should you have any questions, please feel free to contact one of the AP Calculus AB teachers at the e-mail addresses below. Have fun and we’ll see you in September.

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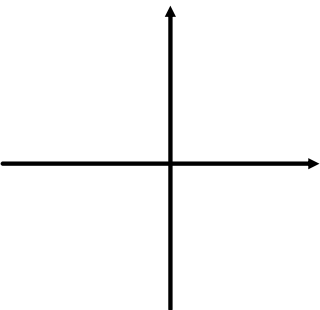
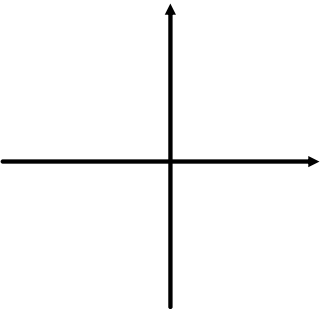
Name _____

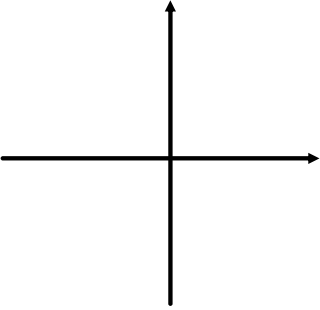
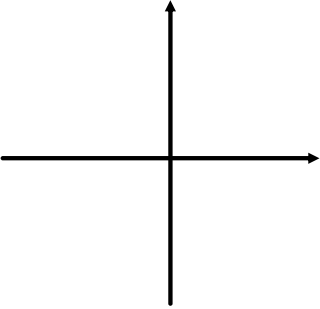
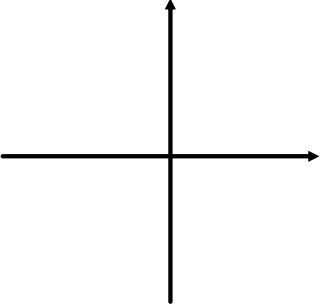
Parent Function: A function that does not have any translations or stretches.

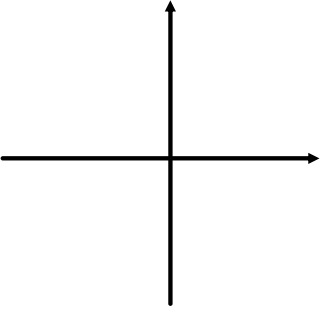
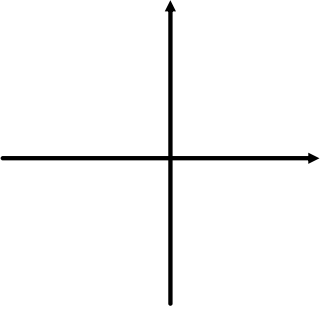
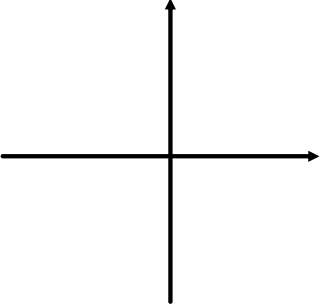
While you may use your calculator to complete the table below, you will be responsible for knowing the characteristics of all of the parent functions included in this packet quickly and effortlessly during your year in calculus without the assistance of a graphing calculator.

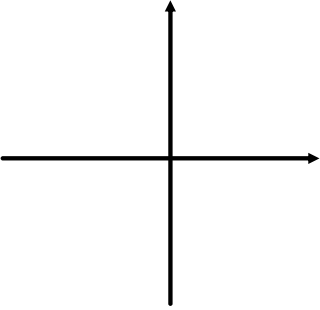
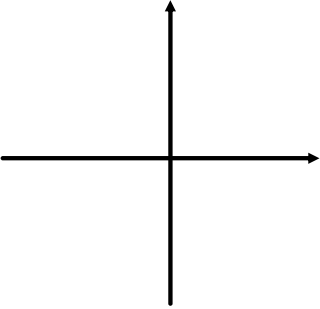
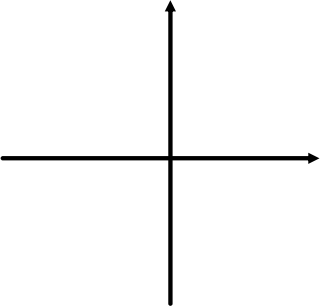
For each parent function:

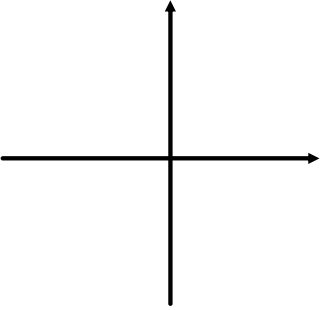
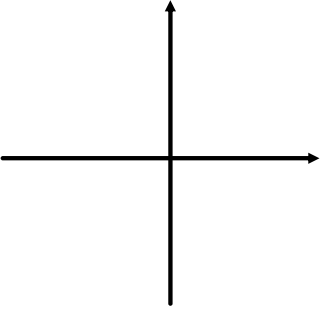
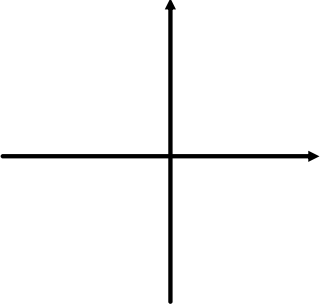
1. Graph the function
2. State the domain and range
3. Determine if there is any symmetry (origin, x-axis or y-axis)
4. Determine if the function is odd, even or neither
5. Write the equation of any asymptotes

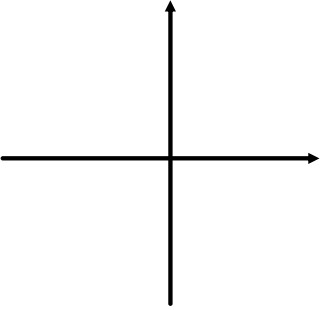
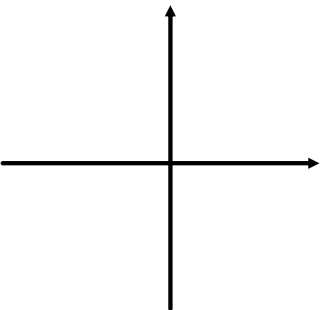
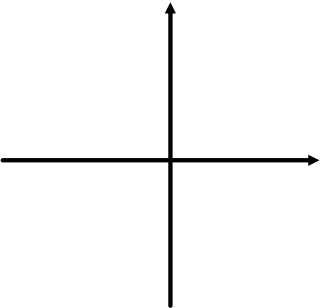
Function Type	Equation	Graph	Characteristics of f(x)
Constant	$f(x) = a$ <p>(where a is a constant for example: $f(x) = 1$ or $y = 1$)</p>		Domain _____. Range _____. Symmetry _____. Even/Odd/Neither _____. Asymptotes _____
Linear	$f(x) = x$		Domain _____. Range _____. Symmetry _____. Even/Odd/Neither _____. Asymptotes _____

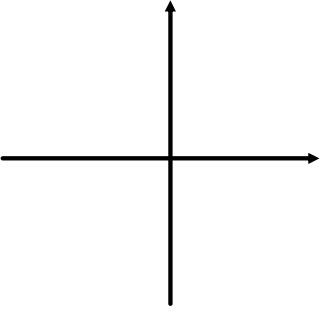
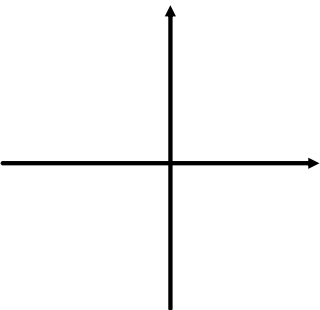
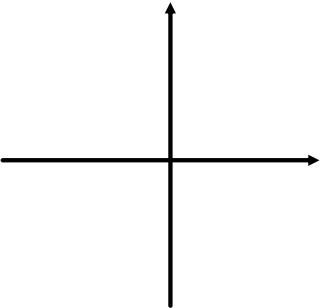
Function Type	Equation	Graph	Characteristics of f(x)
Quadratic	$f(x) = x^2$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Cubic	$f(x) = x^3$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Absolute Value	$f(x) = x $		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.

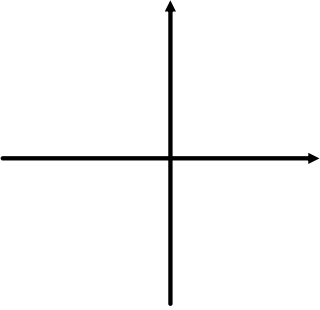
Function Type	Equation	Graph	Characteristics of f(x)
Greatest Integer	$f(x) = \llbracket x \rrbracket$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Square Root	$f(x) = \sqrt{x}$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Cube Root	$f(x) = \sqrt[3]{x}$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.

Function Type	Equation	Graph	Characteristics of f(x)
Reciprocal	$f(x) = \frac{1}{x}$		Domain _____. Range _____. Symmetry _____. Even/Odd/Neither _____. Asymptotes _____.
Squared Reciprocal	$f(x) = \frac{1}{x^2}$		Domain _____. Range _____. Symmetry _____. Even/Odd/Neither _____. Asymptotes _____.
Exponential	$f(x) = a^x$ (where a is a constant for example: $f(x) = 3^x$)		Domain _____. Range _____. Symmetry _____. Even/Odd/Neither _____. Asymptotes _____.

Function Type	Equation	Graph	Characteristics of f(x)
<p>Natural Exponential</p>	<p>$f(x) = e^x$</p> <p>(where e is the irrational number 2.71828....)</p>		<p>Domain_____.</p> <p>Range_____.</p> <p>Symmetry_____.</p> <p>Even/Odd/Neither_____.</p> <p>Asymptotes_____.</p>
<p>Logarithmic</p>	<p>$f(x) = \log_a x$</p> <p>(where a is a constant for example: $f(x) = \log_5 x$)</p>		<p>Domain_____.</p> <p>Range_____.</p> <p>Symmetry_____.</p> <p>Even/Odd/Neither_____.</p> <p>Asymptotes_____.</p>
<p>Natural Logarithmic</p>	<p>$f(x) = \ln x$</p>		<p>Domain_____.</p> <p>Range_____.</p> <p>Symmetry_____.</p> <p>Even/Odd/Neither_____.</p> <p>Asymptotes_____.</p>

Function Type	Equation	Graph	Characteristics of f(x)
Sine	$f(x) = \sin x$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Cosine	$f(x) = \cos x$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Tangent	$f(x) = \tan x$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.

Function Type	Equation	Graph	Characteristics of f(x)
Cotangent	$f(x) = \cot x$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Secant	$f(x) = \sec x$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.
Cosecant	$f(x) = \csc x$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.

Function Type	Equation	Graph	Characteristics of f(x)
Circle	$x^2 + y^2 = 1$		Domain_____. Range_____. Symmetry_____. Even/Odd/Neither_____. Asymptotes_____.

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Graphing Calculator NOT Permitted

Calculus AB

Task #2 - The Algebra of Functions – Solving Functions

Solve each function using **algebraic techniques** such as but not limited to factoring, cross-multiplying and inverse operations without the use of a graphing calculator. You must show the algebraic steps that support the solution to each equation. You may **NOT** use a graphing calculator to solve.

1. $x^2 - 26x + 25 = 0$

2. $6x^2 - x - 12 = 0$

3. $x^2 + x = 6$

4. $\frac{2}{x-1} = 6$

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

6. $\sin x = \frac{1}{2}$ for $0 \leq x < 2\pi$

Continued on Back⇒

Graphing Calculator NOT Permitted

Solve each equation using algebraic techniques NOT a graphing calculator

7. $\cos x = -1$ for $0 \leq x < 2\pi$

8. $\sin^2 x - 1 = 0$ for $0 \leq x < 2\pi$

9. $2e^{3x} = 10$

10. $5e^x + 4 = 1$

11. $\ln(5x) = 3$

12. $\ln(2x) + 6 = 14$

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Graphing Calculator Permitted

Calculus AB

Task #3 - The Algebra of Functions - Information from Graphs of Functions

For each function, identify **A) Domain**, **B) Range**, **C) x-intercepts** and **D) y-intercepts**.

1. $f(x) = \frac{2}{x-1}$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

2. $f(x) = \frac{1-x}{1+x}$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

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

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

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Graphing Calculator Permitted

4. $f(x) = \sqrt{x-10}$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

5. $f(x) = \ln(x+2)$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

6. $f(x) = \ln(x^2)$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

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Graphing Calculator Permitted

7. $f(x) = e^x + 3$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

8. $f(x) = e^{-x} + 3$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

9. $f(x) = xe^x$

A) Domain (input of $f(x)$)	B) Range (output of $f(x)$)	C) x-intercepts (what is the value of x when $y=0$?)	D) y-intercepts (what is the value of y when $x=0$?)

The End.

***This is the end of the AP Calculus AB Summer Packet. Enjoy the rest of your summer.
See you soon 😊***
