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129 people online

They can help you right now!

## Live Study Group

 Write an equation of the line that contains the median of triangle RST from S to line RT. S(-4,7), R(0,1), T(4,7).....HELP!!!!!! 0 replies

 Find the missing side lengths. leave your answers as radicals in simplest form . please help, school finals 4 replies

 determine area of triangle. A=112 degrees b=7, and c=11 6 replies

 an errand boy went to the bank to deposit some bills for his employer. Some of the bills were one-dollar bills and the rest were five-dollar... 1 reply

[by OpenStudy](#)

## Welcome!

Welcome to my online math tutorials and notes. The intent of this site is to provide a complete set of free online (and downloadable) notes and/or tutorials for classes that I teach at [Lamar University](#). I've tried to write the notes/tutorials in such a way that they should be accessible to anyone wanting to learn the subject regardless of whether you are in my classes or not. In other words, they do not assume you've got any prior knowledge other than the standard set of prerequisite material needed for that class. In other words, it is assumed that you know Algebra and Trig prior to reading the Calculus I notes, know Calculus I prior to reading the Calculus II notes, *etc.* The assumptions about your background that I've made are given with each description below.

I'd like to thank Fred J., Mike K. and David A. for all the typos that they've found and sent my way! I've tried to proof read these pages and catch as many typos as I could, however it just isn't possible to catch all of them when you are also the person who wrote the material. Fred, Mike and David have caught quite a few typos that I'd missed and been nice enough to send them my way. Thanks again Fred, Mike and David!

If you are one of my current students and are here looking for homework assignments I've got a set of links that will get you to the right pages listed [here](#).

At present I've gotten the notes/tutorials for my Algebra (Math 1314), Calculus I (Math 2413), Calculus II (Math 2414), Calculus III (Math 2415) and Differential Equations (Math 3401) class online. I've also got a couple of Review/Extras available as well. Among the reviews/extras that I've got are an Algebra/Trig review for my Calculus Students, a Complex Number primer, a set of Common Math Errors, and some tips on How to Study Math.

I've made most of the pages on this site available for download as well. These downloadable versions are in pdf format. Each subject on this site is available as a complete download and in the case of very large documents I've also split them up into smaller portions that mostly correspond to each of the individual topics. Near the top of each page you will see one or two download buttons depending on whether the subject is available as only as a complete document or is

also available in pieces. You can see a complete listing of all the available downloads by selecting the **Downloads** option in the menu. Classes & Extras

Here is a complete listing of all the subjects that are currently available on this site as well as brief descriptions of each.

## Cheat Sheets &amp; Tables

[Algebra Cheat Sheet](#) - This is as many common algebra facts, properties, formulas, and functions that I could think of. There is also a page of common algebra errors included. Currently the cheat sheet is four pages long.

## News

9/7/2011 3:34:13 PM

## New Server

So, I finally managed to get the site to a new server. The old server was ... [more>>](#)

9/17/2008 7:56:01 AM

## Hurricane Ike!!

Well Hurricane Ike moved through here last Friday and I think it caught a l... [more>>](#)

1/15/2008 2:38:52 PM

## New Search

I managed to get Google's new Custom Search Engine up and running on the si... [more>>](#)

1/4/2008 12:06:19 PM

## Differential Equations Updated

I finally managed to get my differential equations notes updated with new m... [more>>](#)

12/19/2007 8:40:14 AM

## Calculus I Update

I added in a new page to the Calculus I notes today. In the Applications o... [more>>](#)

[News Archive](#)

[Algebra Cheat Sheet \(Reduced\)](#) - This is the same cheat sheet as above except it has been reduced so that it will fit onto the front and back of a single piece of paper. It contains all the information that the normal sized cheat sheet does.

[Trig Cheat Sheet](#) - Here is a set of common trig facts, properties and formulas. A unit circle (completely filled out) is also included. Currently this cheat sheet is four pages long.

[Trig Cheat Sheet \(Reduced\)](#) - My standard trig cheat sheet reduced to fit onto the front and back of a single piece of paper. It contains all the information that the normal sized cheat sheet does.

[Calculus Cheat Sheets](#) - These are a series of Calculus Cheat Sheets that covers most of a standard Calculus I course and a few topics from a Calculus II course.

[Common Derivatives and Integrals](#) - Here is a set of common derivatives and integrals that are used somewhat regularly in a Calculus I or Calculus II class. Also included are *reminders* on several integration techniques. Currently this cheat sheet is four pages long.

[Common Derivatives and Integrals \(Reduced\)](#) - My common derivatives and integrals table reduced to fit onto the front and back of a single piece of paper. It contains all the information that the normal sized table does.

[Table of Laplace Transforms](#) - Here is a list of Laplace transforms for a differential equations class. This table gives many of the commonly used Laplace transforms and formulas.

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## Class Notes and Tutorials

[Algebra \(Math 1314\)](#) - Topics included in this set of notes/tutorial are :

- Preliminaries - Exponent Properties, Rational Exponents, Negative Exponents, Radicals, Polynomials, Factoring, Rational Expressions, Complex Numbers
- Solving Equations and Inequalities - Linear Equations, Quadratic Equations, Completing the Square, Quadratic Formula, Applications of Linear and Quadratic Equations, Reducible to Quadratic Form, Equations with Radicals, Linear Inequalities, Polynomial & Rational Inequalities, Absolute Value Equations & Inequalities.
- Graphing and Functions - Graphing Lines, Circles, and Piecewise Functions, Function Definition, Function Notation, Function Composition, Inverse Functions.
- Common Graphs - Parabolas, Ellipses, Hyperbolas, Absolute Value, Square Root, Constant Function, Rational Functions, Shifts, Reflections, Symmetry.
- Polynomial Functions - Dividing Polynomials, Zeroes/Roots of Polynomials, Finding Zeroes of Polynomials, Graphing Polynomials, Partial Fractions.
- Exponential and Logarithm Functions - Exponential Functions, Logarithm Functions, Solving Exponential Functions, Solving Logarithm Functions, Applications.
- Systems of Equations - Substitution Method, Elimination Method, Augmented Matrix, Nonlinear Systems.

The Algebra notes/tutorial assume that you've had some exposure to the basics of Algebra. In particular it is assumed that the exponents and factoring sections will be more of a review for you. Also, it is assumed that you've seen the basics of graphing equations. Graphing particular types of equations is covered extensively in the notes, however, it is assumed that you understand the basic coordinate system and how to plot points.

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[Calculus I \(Math 2413\)](#) - Topics included in this set of notes/tutorial are :

- Algebra/Trig Review - Trig Functions and Equations, Exponential Functions and Equations,

Logarithm Functions and Equations.

- Limits - Concepts, Definition, Computing, One-Sided Limits, Continuity, Limits Involving Infinity, L'Hospitals Rule
- Derivatives - Definition, Interpretations, Derivative Formulas, Power Rule, Product Rule, Quotient Rule, Chain Rule, Higher Order Derivatives, Implicit Differentiation, Logarithmic Differentiation, Derivatives of Trig Functions, Exponential Functions, Logarithm Functions, Inverse Trig Functions, and Hyperbolic Trig Functions.
- Applications of Derivatives - Related Rates, Critical Points, Minimum and Maximum Values, Increasing/Decreasing Functions, Inflection Points, Concavity, Optimization
- Integration - Definition, Indefinite Integrals, Definite Integrals, Substitution Rule, Evaluating Definite Integrals, Fundamental Theorem of Calculus
- Applications of Integrals - Average Function Value, Area Between Curves, Solids of Revolution, Work.

The Calculus I notes/tutorial assume that you've got a working knowledge of Algebra and Trig. There is some review of a couple of Algebra and Trig topics, but for the most part it is assumed that you do have a decent background in Algebra and Trig. These notes assume no prior knowledge of Calculus.

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[Calculus II \(Math 2414\)](#) - Topics included in this set of notes/tutorial are :

- Integration Techniques - Integration by Parts, Integrals Involving Trig Functions, Trig Substitutions, Integration using Partial Fractions, Integrals Involving Roots, Integrals Involving Quadratics, Integration Strategy, Improper Integrals, Comparison Test for Improper Integrals, and Approximating Definite Integrals.
- Applications of Integrals - Arc Length, Surface Area, Center of Mass/Centroid, Hydrostatic Pressure and Force, Probability.
- Parametric Equations and Polar Coordinates - Parametric Equations & Curves, Calculus with Parametric Equations (Tangents, Areas, Arc Length and Surface Area), Polar Coordinates, Calculus with Polar Coordinates (Tangents, Areas, Arc Length and Surface Area).
- Sequences and Series - Sequences, Series, Convergence/Divergence of Series, Absolute Series, Integral Test, Comparison Test, Limit Comparison Test, Alternating Series Test, Ratio Test, Root Test, Estimating the Value of a Series, Power Series, Taylor Series, Binomial Series
- Vectors - Basics, Magnitude, Unit Vector, Arithmetic, Dot Product, Cross Product, Projection
- Three Dimensional Coordinate System - Equations of Lines, Equations of Planes, Quadratic Surfaces, Functions of Multiple Variables, Vector Functions, Limits, Derivatives, and Integrals of Vector Functions, Tangent Vectors, Normal Vectors, Binormal Vectors, Curvature, Cylindrical Coordinates, Spherical Coordinates

The Calculus II notes/tutorial assume that you've got a working knowledge Calculus I, including Limits, Derivatives, and Integration (up to basic substitution). It is also assumed that you have a fairly good knowledge of Trig. Several topics rely heavily on trig and knowledge of trig functions.

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[Calculus III \(Math 2415\)](#) - Topics included in this set of notes/tutorial are :

- Three Dimensional Coordinate System - Equations of Lines, Equations of Planes, Quadratic Surfaces, Functions of Multiple Variables, Vector Functions, Limits, Derivatives, and Integrals of Vector Functions, Tangent Vectors, Normal Vectors, Binormal Vectors, Curvature, Cylindrical Coordinates, Spherical Coordinates
- Partial Derivatives - Limits, Partial Derivatives, Higher Order Partial Derivatives, Differentials, Chain Rule, Directional Derivatives, Gradient.
- Applications of Partial Derivatives - Tangent Plane, Normal Line, Relative Extrema, Absolute Extrema, Optimization, Lagrange Multipliers.
- Multiple Integrals - Iterated Integrals, Double Integrals, Double Integrals in Polar Coordinates, Triple Integrals, Triple Integrals in Cylindrical Coordinates, Triple Integrals in Spherical Coordinates, Change of Variables, Surface Area.
- Line Integrals - Vector Fields, Line Integrals With Respect to Arc Length, Line Integrals With

Respect to  $x$  and  $y$ , Line Integrals of Vector Fields, Fundamental Theorem of Line Integrals, Conservative Vector Fields, Potential Functions, Green's Theorem, Curl, Divergence.

- Surface Integrals - Parametric Surfaces, Surface Integrals, Surface Integrals of Vector Fields, Stokes' Theorem, Divergence Theorem.

The Calculus III notes/tutorial assume that you've got a working knowledge Calculus I, including limits, derivatives and integration. It also assumes that the reader has a good knowledge of several Calculus II topics including some integration techniques, parametric equations, vectors, and knowledge of three dimensional space.

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[Differential Equations \(Math 3301\)](#) - Topics included in this set of notes/tutorial are :

- First Order Differential Equations - Linear Equations, Separable Equations, Exact Equations, Equilibrium Solutions, Modeling Problems.
- Second Order Differential Equations - Homogeneous and Nonhomogeneous Second Order Differential Equations, Fundamental Set of Solutions, Undetermined Coefficients, Variation of Parameters, Mechanical Vibrations
- Laplace Transforms - Definition, Inverse Transforms, Step Functions, Heaviside Functions, Dirac-Delta Function, Solving IVP's, Nonhomogeneous IVP, Nonconstant Coefficient IVP, Convolution Integral.
- Systems of Differential Equations - Matrix Form, Eigenvalues/Eigenvectors, Phase Plane, Nonhomogeneous Systems, Laplace Transforms.
- Series Solutions - Series Solutions, Euler Differential Equations.
- Higher Order Differential Equations -  $n^{\text{th}}$  order differential equations, Undetermined Coefficients, Variation of Parameters,  $3 \times 3$  Systems of Differential Equations.
- Boundary Value Problems & Fourier Series - Boundary Value Problems, Eigenvalues and Eigenfunctions, Orthogonal Functions, Fourier Sine Series, Fourier Cosine Series, Fourier Series.
- Partial Differential Equations - Heat Equation, Wave Equation, Laplace's Equation, Separation of Variables.

These notes assume no prior knowledge of differential equations. A good grasp of Calculus is required however. This includes a working knowledge of differentiation and integration.

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Reviews & Extras

[Algebra/Trig Review](#) - This is an Algebra Review and Trig Review that was originally written for my Calculus I students. It is still geared mostly towards Calculus students with occasional comments on how a topic will be used in a Calculus class. However, anyone needing a review of some of the basic algebra, trig, exponential functions and logarithms should find the information of use.

Not all the topics covered in an Algebra or Trig class are covered in this review. I've mostly covered topics that are of particular importance to students in a Calculus class. I have included a couple of topics that are not that important to a Calculus class, but students do seem to have trouble with on occasion. As time permits I will be adding more sections as well.

The review is in the form of a problem set with the first solution containing detailed information on how to work that type of problem. Later solutions are usually not as detailed, but may contain more/new information as required.

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[Complex Number Primer](#) - This is a brief introduction to some of the basic ideas involved with Complex Numbers. The topics covered are a brief review of arithmetic with complex numbers, the complex conjugate, modulus, polar and exponential form and computing powers and roots of complex numbers.

Note that this primer does assume that you've at least seen some complex numbers prior to reading. The purpose of this document is go a little beyond what most people see when the first are introduced to complex numbers in say a College Algebra class. Also, this document is in no way intended to be a complete picture of complex numbers nor do I cover all the concepts involved (that's a whole class in and of itself).

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[Common Math Errors](#) - As with the Algebra/Trig review this was originally written for my Calculus I class. However, only one of the five sections that I've given here directly addresses the topic of Calculus. The other four sections are more general errors or cover Algebra and Trig errors. There are a couple of calculus examples in the first four sections, but in all of these cases I've also tried to provide non Calculus examples as well.

This portion of the site should be of interest to anyone looking for common math errors. If you aren't in a Calculus class or haven't taken Calculus you should just ignore the last section.

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[How To Study Math](#) - This is a short section with some advice on how to best study mathematics.

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