



General Course Information for MA 15300, MA 15400, and MA 15900 Purdue University Fort Wayne

1. The Course Goals

Many students take this course because it is required for their degree. But there are better reasons than that! In *College Algebra* (MA 15300), *Trigonometry* (MA 15400), and *Precalculus* (MA 15900) you will:

- Highlight the link of mathematics to the real world.
- Develop a wide base of mathematical knowledge, including
 - basic skills and concepts,
 - a functional view of mathematics, including graphical, algebraic, numerical, and contextual viewpoints,
 - properties and applications of some of the basic families of functions
 - geometric visualization,
 - problem solving, predicting, critical thinking, and generalizing.
- Incorporate the use of general academic skills such as
 - communicating mathematics concepts,
 - understanding and using technology, and
 - working collaboratively.

The above aligns with the foundational intellectual skills for quantitative reasoning in the [Indiana General Education Core](#), the goals of the [Purdue Fort Wayne Baccalaureate Framework](#), and is based on the guidelines of the Mathematical Association of America's subcommittee, Curriculum Renewal Across the First Two Years (See maa.org/cupm/crafty and maa.org/sites/default/files/pdf/CUPM/crafty/introreport.pdf#page=54)

2. General Education Course Learning Outcomes

The courses MA 15300, MA 15400, and MA 15900 address all eight outcomes in Area 2: Quantitative Reasoning of the Indiana General Education Core (listed below). Through hands-on activities and assessments you will

- create and interpret mathematical models to solve problems presented as real world situations,
- formulate, validate, and analyze solutions to problems using mental, paper and pencil, algebraic, and technology-based techniques as appropriate
- utilize graphing calculators to find the solution to problems which cannot be solved by pencil and paper, as well as explore mathematical patterns and visualize mathematical ideas,
- recognize and cite assumptions made in real world problem solving, and
- communicate your reasoning.

Indiana General Education Area 2 Quantitative Reasoning Competencies	
<p>Interpretation 3.1. Interpret information that has been presented in mathematical form (e.g. with functions, equations, graphs, diagrams, tables, words, geometric figures).</p> <p>Representation 3.2. Represent information/data in mathematical form as appropriate (e.g. with functions, equations, graphs, diagrams, tables, words, geometric figures).</p> <p>Mathematical Procedures 3.3. Demonstrate skill in carrying out mathematical (e.g. algebraic, geometric, logical, statistical) procedures flexibly, accurately, and efficiently to solve problems.</p>	<p>Critical Thinking 3.4. Analyze mathematical arguments, determining whether stated conclusions can be inferred.</p> <p>Application / Analysis 3.5. Communicate which assumptions have been made in the solution process. 3.6. Analyze mathematical results in order to determine the reasonableness of the solution. 3.7. Cite the limitations of the process where applicable.</p> <p>Communication 3.8. Clearly explain the representation, solution, and interpretation of the math problem.</p>

See www.pfw.edu/academics/general-education/ for more information about the Indiana General Education Core.

3. The Purdue Fort Wayne Baccalaureate Framework

The Purdue Fort Wayne faculty have identified six foundations of baccalaureate education. These foundations provide the framework for all baccalaureate degree programs.

Acquisition of Knowledge Students will demonstrate breadth of knowledge across disciplines and depth of knowledge in their chosen discipline. In order to do so, students must demonstrate the requisite information-seeking skills and technological competencies.

Application of Knowledge Students will demonstrate the ability to integrate and apply that knowledge, and, in so doing, demonstrate the skills necessary for life-long learning.

Personal & Professional Values Students will demonstrate the highest levels of personal integrity and professional ethics.

A Sense of Community Students will demonstrate the knowledge and skills necessary to be productive and responsible citizens and leaders in local, regional, national, and international communities. In so doing, students will demonstrate a commitment to free and open inquiry and mutual respect across multiple cultures and perspectives.

Critical Thinking and Problem Solving Students will demonstrate facility and adaptability in their approach to problem solving. In so doing, students will demonstrate critical-thinking abilities and familiarity with quantitative and qualitative reasoning.

Communication Students will demonstrate the written, oral, and multimedia skills necessary to communicate effectively in diverse settings.

The foundations are interdependent, with each one contributing to the integrative and holistic education offered at the University.

4. Keys to Success

Your behavior is a key ingredient to your learning.

- You are expected to not only attend all class meetings, but participate in your group and contribute to the learning environment of the class as a whole. Travel plans, social functions on campus, appointments with an advisor, non-emergency appointments with your dentist, etc., are never an excuse to miss class.
- Be in your seat and ready to begin at the start of class and do not leave until the class is finished. Sit with your assigned group members.
- Come prepared to be engaged in learning mathematics. The classroom is not a place to read the newspaper, work on homework from other courses, send/receive text messages, or surf the Internet. Once you arrive to class, bring out your graphing calculator. Silence and put away any other electronic devices.
- Listen actively. When your instructor or your fellow students are talking to the class, be respectful, polite, and silent so that people around you can hear. Do not continue working in your group.
- To benefit from an interactive class, come to class prepared, having done the assigned reading and attempted the homework problems so you can contribute to your team. Ask questions if you have trouble as soon as you have difficulty. Use your instructor's office hours or the department's common office hour program.
- Show your work if the solution requires it, as opposed to just writing down an answer. Problem solving is a central focus of this course. Documenting the journey is at least as important as reporting the final destination.

5. Study Time Outside of Class

This course requires a solid effort. During the Fall or Spring Semester, the faculty at IPFW expect you to study a minimum of 6 hours a week outside of class working on mathematics for MA 15300 or MA 15400 and 10 ten hours per week for MA 15900. This pace is accelerated in the summer sessions.

6. Accessibility and Accommodations

If you have a disability and need assistance, special arrangements can be made to accommodate most needs. Contact the Director of Services for Students with Disabilities (SSD). They are located at Walb Student Union, Room 113, telephone 481-6658, as soon as possible to work out the details. Once the Director has provided you with a letter attesting to your needs for modification, bring the letter to your instructor. For more information, please visit the Web Site for SSD: pfw.edu/ssd/.

7. Prerequisite Skills

MA 15300, MA 15400, and MA 15900 are intended for students who have completed two years of high school algebra. The prerequisite for MA 15300 or MA 15900 is completion of Intermediate Algebra MA 11300 with a B- or higher or placement by departmental exam. The prerequisite for MA 15400 is MA 15300 with a C- or higher or placement by departmental exam. It is assumed that you are proficient in many of the skills mentioned in the sections of the text called **Skills Refresher**.

Take a look at the kinds of problem below. If they do not look familiar, perhaps you need to drop the class and take either the prerequisite *Intermediate Algebra* MA 11100, or even a course lower than MA 11100. Click on the link pfw.edu/departments/coas/depts/math/courses/math-placement.html for more details about the topic, additional free online practice from Khan Academy, and related videos.

Course Topic	<i>Functions Modeling Change, 5th Ed.</i>
Set up and solve linear equations and inequalities. Solve Basic Linear Equations Solve Multi-Step Linear Equations Solve One-Step Linear Inequalities Solve Multi-Step Linear Inequalities	Section 1.1: 43 Skills Refresher for Ch 1: 1-11 odd, 23-31 odd Section 2.2: S3-S8
Use function notation. Find the domain and range of a function if given its graph.	Section 1.1: S1-S10, 9, 11, 13, 15 Section 2.1: 3, 5, 21, 23b Section 2.2: 1, 3
Know your Lines Select the graph that represents a given slope. Find the slope from a graph using a grid. Find the slope from two points. Slope intuition. Find x- and y-intercepts from a linear graph or formula. Slope-intercept equation from two points. Write the equation of a line (vertical, horizontal, and otherwise) in any form. Graph lines (vertical, horizontal, and otherwise). Find and interpret the rate of change of linear functions. Point-Slope Form to Slope-Intercept Form. Equations of Parallel and Perpendicular Lines. Model a Problem with a Linear Function	Section 1.3: 3-15 odd, 41, 43 Ch 1 Review: 11, 13, 47
Solve a systems of two linear equations (having no, one, or many solutions) by graphing, substitution, or elimination.	Section 1.5: S1-S8 Ch 1 Review: 47 Skills Refresher for Ch 1: 37, 39, 43, 45, 77, 49
Simplify expressions with positive and negative integer exponents Rewrite fractional exponents Manipulate fractional exponents Simplify positive and negative fractional exponents	Skills Refresher for Ch 4: 1-17 odd, 69-81 odd Section 4.2: S1-S10 Skills Refresher for Ch 4: 19-33 odd, 49 Section 11.1: S6
Simplify radicals, multiply/divide radicals, and solve radical equations.	Ch 1 Review: 67 Section 2.1: S8 Skills Refresher for Ch 4: 9, 35
Use the Distributive Property of multiplication over addition to expand a polynomial. Reverse the process by factoring. Solve quadratic equations by factoring or taking square roots of both sides of the equation or using the quadratic formula.	Section 2.1: S3 Section 2.4: S5-S8 Skills Refresher for Ch 3 (Factoring): 1-49 odd, 69, 75, 77, 79 Section 11.2: S1-S8
Simplify rational expressions and find values for which the expression is zero or undefined. Solve rational equations.	Section 2.1: S9, 5, 23b Section 2.2: S1, S2 Skills Refresher for Ch 3 (Factoring): 71, 85, 87 Skills Refresher for Ch 11: 1-15 odd
Rounding Numbers	See the last page of this handout.

For MA 154, in addition to the above, see pfw.edu/departments/coas/depts/math/courses/math-placement.html for more practice questions. Work these problems to make sure you have the tools you need to succeed.

8. Calculator

You will be required to use a graphing calculator for activities and assignments in and out of class. This is not optional. The TI-83, TI-83 Plus or TI-84 Plus, TI-84 Plus CE is strongly recommended. You may use another equivalent calculator* but you will be responsible for understanding how to use it. Your instructor will be most familiar with the TI-83/84 or TI-83/84 Plus and may not be able to offer you help with other calculators.

*Your calculator should have features which enable you to find intersection points, zeros (or roots), and maximum/minimum points of graphs. If you have questions whether your model of calculator is allowed, ask your instructor.

Graphing Calculator Loan Program: You can rent a TI-83 or TI-83 Plus for the semester for a nominal fee from the Student Government Association (pfw.edu/affiliates/stugov/) located in the Walb Student Union Room 225 (260-481-6586). See pfw.edu/affiliates/stugov/services/calculator-rentals.

9. A Team Approach to Problem Solving

A primary goal in this course is the ability to work as a functioning member of a team to solve challenging problems and analyze mathematical information. Working in a group not only helps you develop the interpersonal skills required for the workplace, but will help you meet many other course goals as well:

- communicating your reasoning orally,
- actively listening and understanding the reasoning of other team members, and
- creating logical arguments. If you can't explain it, it is likely you don't fully understand it.

Group Roles

Effective groups are organized and have clearly defined roles for its members. Group roles could include:

Manager – encourages all members of the group to participate in the discussion and share their ideas, keeps the group on task, and takes one of the other roles if one of the group members is absent.

Reader – reads the problem aloud to the group. Afterwards, takes on other roles, such as Quality Controller.

Scribe – writes up the group's solution to the problem for presentation to the class, showing the necessary steps to the solution and, if appropriate, writing verbal interpretations of the mathematical concepts in complete sentences.

Quality Controller – double-checks for correctness, capitalizing on multiple perspectives where appropriate.

10. Internet Resources and your Computer Lab Account

Student-access computer labs are located around campus. For a complete list, go to the Information Technology Services Website at <http://pfw.edu/its/>, click on **Resources & Services** and then **Facilities**. You will should see a link for **Student open access computer labs**. To use the computers in these labs you must have an activated your university computer Lab Account, which you received when you enrolled. If you need assistance, contact the IPFW Help Desk, 260-481-6030, or Kettler 206, or email helpdesk@ipfw.edu.

MA 15300 Website: <https://www.pfw.edu/departments/coas/depts/math/courses/math-153.html>

MA 15400 Website: <https://www.pfw.edu/departments/coas/depts/math/courses/math-154.html>

11. e-Homework (eHW)

You will be required to use a Web-based electronic homework (eHW) system, which immediately grades your answers and provides worked-out solutions for you to have virtually unlimited practice.

Getting to the eHW Site To access eHW, go to pfw.edu/departments/coas/depts/math/courses/e-homework.html. This link is also reachable from the Math Department page at pfw.edu/math under **e-Homework**.

Purchasing an eHW Access Code (User ID and Password) On the **e-Homework** Page, you can click on a link to get to the Web Store to purchase an account for Möbius (formerly called Maple TA) at a nominal cost. Access codes are good for an entire year.

Upon purchasing your code you will be asked for your e-mail, which can be a personal email or a school email. Please carefully enter your information.

For example, if George Washington were a student at PFW, his e-mail might likely be something like the following:

washg01@pfw.edu

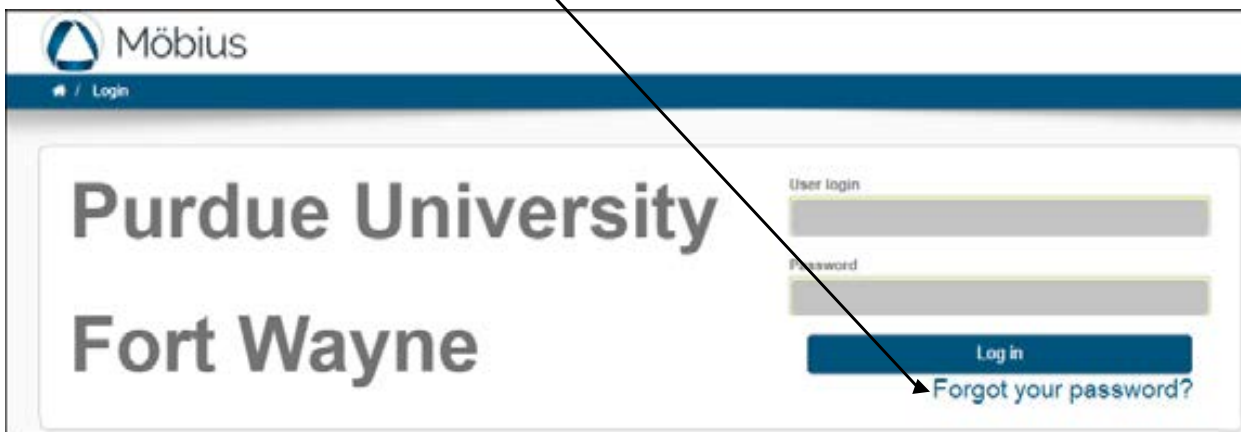
E-mail addresses like the one below no longer exist after October 17, 2018:

~~**washg01@students.pfw.edu**~~

- Access codes can only be purchased online.
- During the transaction, the Web Store will prompt you to create a user login and password. Write it down, as well as the e-mail that you registered with the Digital Ed.
- For help purchasing an access code: call 1-833-450-2211 or e-mail support@digitaled.com
- You can use a paypal account or a credit card to purchase the code. Unfortunately, a debit card or a pre-loaded department store credit card can not be used. If you do not have a credit card or paypal account, perhaps you can use a friend's card (and reimburse them). If all else fails, see your instructor for help.


Logging into the eHW Site

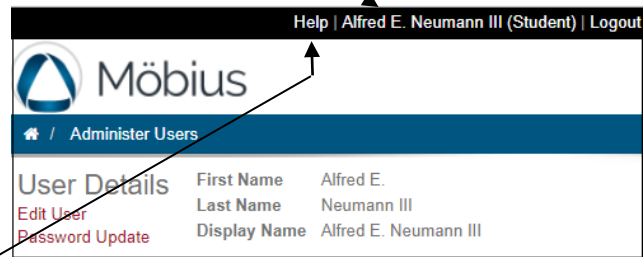
If you already have purchased a code, go to <https://pfw.mapleserver.com/pfw/login> for the login screen. Or, on the **e-Homework** Page, you can click on a link to take you to the login screen. The **Forgot your password?** link can be handy if you have already purchased an account and have registered your e-mail in the system.



Change Your Password

Click on your **full name** at the top right corner of the screen (next to Logout) to change your password or edit your personal information.

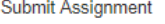
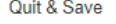


Click on  at the top of the screen to return.



Need Help?

Click on the **Help** link on the top of the screen next to your name for online help. You can also e-mail ehwtechsupport@pfw.edu to get help with technical issues. Describe the problem in as much detail as possible. Include your full name when sending an email. If you forgot your password, the **Forgot your password?** link on the login screen gets you an immediate response sent to the email address you have entered in your profile.

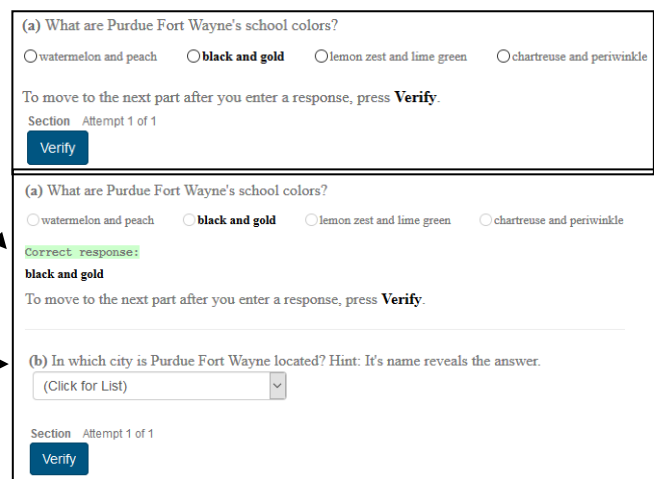
Tips



- Be aware that these two buttons behave differently:  
The only way your assignment will be graded is if you click on the first button, **Submit Assignment**. Your work will be instantaneously graded and you will see your score. You would click on the second button, **Quit & Save**, to return to the assignment to work on it later. **If you can see it in your Gradebook link, your instructor can see it as well.**
- Once you have submitted your assignment and it is graded, click on  to view your graded assignment and see any detailed feedback that is available, with an option to print.
- To make the most out of eHW, try the assignments as many times as you can. Use “Just for Practice” sets to see worked out solutions of problems that are similar to those on your assignment. Use the “Flash Cards” to hone in on particular learning outcomes.
- Some questions may be delivered to you one part at a time, such as the one shown below. After you enter your answer, click on  to move to the next part.

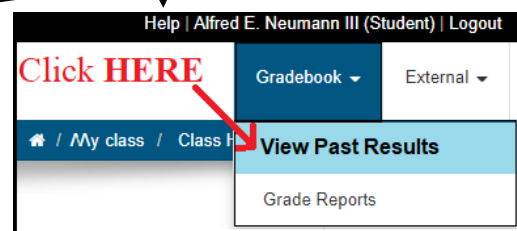
In some questions, the correct answer to the first part of the question may display before you enter the answer to the next part.

After clicking **Verify** part (b) of the question will display.

Be sure to complete all parts of the questions.



- The top score on your assignment appears on the home page , but you can see grades of all passed attempts and details of the solutions by clicking on the link **Gradebook > View Past Results**. See online help  for more on using the Gradebook.



Working with Math in Responses

You enter formulas similar to the way you do in a graphing calculator, following the rules for standard order of operations. Some helpful tips follow for entering responses.

Avoiding Common Math Errors

1. **Exponents:** Use the caret, ^, for exponentiation, and the letter e for 2.718...
2. **Parentheses:** As on a graphing calculator, you must use parentheses. When in doubt, you can use the **Preview** option to see it look the way it would in a math text.

Examples:

For $2^{x/13}$, you must type `2^(x/13)`

not `2^x/13` ... which would be interpreted as $\frac{2^x}{13}$

For $y = \frac{x}{4(x-2)}$, you must type `y = x/(4(x-2))`

not `y = x/4(x-2)` ... which would be interpreted as $\frac{x}{4}(x-2)$

3. **Multiplication:** You can type an asterisk (i.e. *) for multiplication, or just type a letter and a number together (i.e. 2x). However, πx (see #7 below) must be entered as `pi*x` and not `pix`.
4. **Square Roots:** The square root function is `sqrt(x)` or you can just type $x^{(1/2)}$ or $x^{0.5}$ instead. Note again that, like on a graphing calculator, $x^{1/2}$ means $\frac{x^1}{2}$.
5. **Absolute Value:** The absolute value function is `abs(x)`, so something like $2|x+1|-3$ would be typed as `2abs(x+1)-3`.
6. **Input of Functions:** You should always place the argument of a function in parentheses. For example, for $\sqrt{3x}$ you must type `sqrt(3x)`, not `sqrt 3x` which would be as $\sqrt{3} \cdot x$.

For MA 15400 or MA 15900 students especially:

7. π : Simply type `pi` or `pi`. (However, not `PI`.) For πx , enter `pi*x` and not `pix`.
8. **Trigonometric Functions:** The names for common mathematical functions (sin, cos, etc.) are just what you would expect. The inverse trig functions are `arcsin(x)`, `arccos(x)`, and `arctan(x)`. Also, trigonometric functions are all set to work in radians.


Using the Preview Option in Responses


Use the **Preview** option to view your response as a typeset mathematics expression. **Preview** demonstrates how the system interprets your entry (inspecting it for misplaced parentheses and other unintended keystrokes).

For example, suppose you were to incorrectly type `sqrt(179)+3/pi` in the box in the following question.


Enter the following in the response box.
Type `pi` for π . Use the forward slash key (/) for division.


$$\frac{\sqrt{179} + 3}{\pi}$$


TIP: Click on the Preview icon after the box (which looks like ) to check your formula:

`sqrt(179)+3/pi` 


After clicking Preview, you can correct your response before submitting it for a grade.


`(sqrt(179)+3)/pi` 

Preview 

$\sqrt{179} + \frac{3}{\pi}$ 

Close

Preview 

$\frac{\sqrt{179} + 3}{\pi}$ 

Close

Order of Operations

Using order of operations correctly is part of the mathematical content of the course, not something extra to satisfy a picky piece of software. Order of precedence is as follows:

Parentheses

Exponents

Multiplication and Division (from left to right)

Addition and Subtraction (from left to right)

Some students use the mnemonic:

Please

Excuse

My Dear

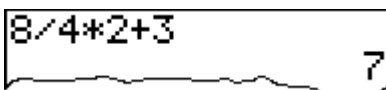
Aunt Sally

For example, if you were to compute $8 \div 4 \times 2 + 3$, multiplication and division outrank addition, but multiplication and division are the same rank.

$$8 \div 4 \times 2 + 3 = \frac{8}{4} \times 2 + 3 = 4 + 3 = 7$$



Notice this is what you would obtain from a graphing calculator:



Rules for order of operations are necessary so that a unique value results. Consider the following:

$$8 \div 4 \times 2 + 3 \neq \frac{8}{4 \times 2} + 3 = 1 + 3 = 4$$



$$8 \div 4 \times 2 + 3 \neq \frac{8}{4 \times 2 + 3} = \frac{8}{11}$$



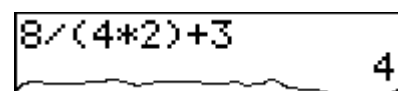
$$8 \div 4 \times 2 + 3 \neq \frac{8}{4} \times (2 + 3) = 2 \times 5 = 10$$



Parentheses outrank all operations. If your intention is to have $\frac{8}{4 \times 2} + 3$, the fraction bar serves as a grouping symbol.

The expression $\frac{8}{4 \times 2} + 3$ is equivalent to $\frac{8}{(4 \times 2)} + 3$.

So if our intention is $\frac{8}{4 \times 2} + 3$, we need parentheses: $8 \div (4 \times 2) + 3$.



Nested Parentheses

To computers and graphing calculators, brackets such as [or] or braces such as { or } are not equivalent to parentheses.

For example, to enter $3^{2/(x+1)}$ you would type $3^{(2/(x+1))}$



as opposed to $3^{(2/[x+1])}$.



Rules for Rounding

Standard rules for rounding numbers apply.

For example, suppose we are rounding the following calculations to two decimal places.

1.12^2	1.2544
1.12^8	2.475963176
1.12^{41}	104.2170869

Look to the right of the rounding digit, which we have underlined.

If it is 4 or lower, we truncate. So to two decimal places, $1.12^2 \approx 1.25$

If it is 5 or higher, we round up. So to two decimal places, $1.12^8 \approx 2.48$

and to two decimal places, $1.12^{41} \approx 104.22$

What is 1.12^{23} to two decimal places? Since the digit to the right of the rounding digit is 2, we have $1.12^{23} \approx 13.55$.

1.12^{23}	13.55234726
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12. Help!

So you're working your hardest, doing the assignments, studying every night, but it's just not enough?

<p>Suggestion 1: Read the book. Really, really read it. Sit down and read it. Carefully. Again and again.</p> <p>Suggestion 2: Do lots of individual homework. Understanding material in later chapters typically requires that you understand concepts in previous ones.</p> <p>Suggestion 3: Recopy your notes.</p> <p>Suggestion 4: Problem solving requires persistence. If you don't understand something the first time, you're in good company. Even Einstein had trouble and said, "Do not worry about your difficulties in Mathematics. I can assure you mine are still greater." Don't just give up. Take a break and come back and try again!</p> <p>Suggestion 5: Remember, there's no substitute for daily preparation. Get help as soon as any problems arise. Which takes you to the second column of resources....</p>	<p>Resource 1. Talk to your instructor. Use the office hours.</p> <p>Resource 2. Use the features of eHW, including viewing the details of worked out solutions, the <i>Just for Practice</i> homework sets, and eHW <i>Flash Cards</i>.</p> <p>Resource 3. If you can, meet with your group members outside of class and do your homework together. If this isn't possible, talk with them as soon as you get to class about any assigned problems that gave you trouble.</p> <p>Resource 4. Use the office hours of other instructors who teach the same course.</p> <p>Resource 5: Use the free tutoring offered in KT G19.</p> <p>Resource 6: Use the Web, starting first with the Internet resources listed in this handout.</p>
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