SYLLABUS

♥ Math 125 _ Intermediate Algebra ♥

Section # 4490

CLASS MEETING: TTH 7:15 – 9:50 PM

Location MSA 109

Spring 2015; Feb 9-July 7

CONTACT METHODS: Access Me Via

EMAIL: GHARAMJ @ WLAC.EDU

(MOST PREFERRED CONTACT METHOD)

VOICEMAIL: 310 434 8023

( NOT RELIABLE METHOD BUT INEVITABLE ALTERNATIVE.)

Sample email:  
Subject: Math 125 SID 2514  I forgot to pick up my quiz
Can I have my Quiz 4 next time?

Sample voicemail:  
Math 125, SID two-five-one-four 25-14.
I am unable to attend class today 10-5-2014. I will submit the reason of absence next time.

Office Hours

• Day: TTh  
Time: 6:30 – 7:10 PM
Location: Conference Room Math dept. (Classroom Upon Availability)

• You can email me your questions. I will try to address your concern if writing is a possible option.

REQUIREMENTS: Please do not forget to bring the following on each session.

1. Textbook (or e-Book)


2. Scientific Calculator

Scientific Calculator is an advisory instrument that you can use for making tedious calculations. Checking your answers with calculator is a good idea but students are not permitted to use calculator on exams (Unless otherwise specified.)

3. 3-Hole Binder For Class Notes and For Homework

Please use three-hole binders for keeping your notes and class assignments separate. Keep your writings clean and organized. There is never enough time to search for things in class.

Prerequisite: Successful completion of Math 115, or by placement exam.

Institutional SLO - Student Learning Outcomes:

A. Critical Thinking: Analyze problems by differentiating fact from opinions, using evidence, and using sound reasoning to specify multiple solutions and their consequences.

B. Quantitative Reasoning: Identify, analyze, and solve problems that are quantitative in nature.

Program SLO

1. Apply quantitative thinking processes using basic mathematical operations to solve common academic, workplace, and family problems. (Theme: mathematical operations)

2. Use mathematical tools essential for analyzing quantitative problems and for producing solutions. (Theme: mathematical tools)

3. Select appropriate math strategies for solving and handling real life problems involving finance, economics, and family issues. (Theme: mathematical problem-solving)

Course SLOs

1. Apply quantitative thinking processes using basic mathematical operations (addition, subtraction, multiplication, division) to solve common academic, workplace, and family problems. (Theme: mathematical operations)

2. Use mathematical tools essential for analyzing quantitative problems and for producing solutions. (Theme: mathematical tools)

3. Select appropriate math strategies for solving and handling real life problems involving finance, economics, and family issues. (Theme: mathematical problem-solving)
**Course Description:**

This course is equivalent to the second year of high school algebra. Topics will include rational, irrational and complex numbers; fundamental operations on algebraic expressions and functions; introduction to polynomial, rational, exponential and logarithmic functions, equations and graphs; circles and parabolas. Emphasis is on “advanced” algebraic factoring and simplification.

**Course Entry Skills**

Prior to enrolling in Math 125 student can perform all of the following:

- Solve linear, quadratic, literal equations, systems of equations and linear inequalities by choosing an appropriate method.
- Graph linear equations and inequalities
- Simplify exponential expressions
- Factor general trinomials at an elementary level
- State and apply quadratic formula
- Add, subtract, multiply, and divide polynomials, square roots and exponential expressions
- Simplify complex fractions, square roots and exponential expressions
- Solve introductory level equations with rational expressions
- Translate and solve algebraic word problems in a single variable
- Given the description of a graph of a line, write the equation of that line
- Define and use properties of equality and inequality
- Recognize and use common mathematical language to describe mathematical processes in either written or verbal form
- Apply units of measurements in the solution of algebraic applications as appropriate

**Evaluation:** FINAL EXAM, TEST, QUIZ, HOMEWORK

All graded materials are counted from 100.

**TESTs (55% of the final grade, Time 7:15 – 8:45 PM)**

Five TESTs containing 15-40 short/long/multiple choice questions are planned in course schedule (Page 7). Majority of questions on TESTs are from problems solved in class during lecture or Q&A period. Quizzes and Worksheets are designed to help students be prepared for TEST and consequently for the Final exam.

Points assigned for TEST are based on an elaborated rubric prepared for shown work and final answer. A right answer without clear and non confusing supportive work can't be evaluated fairly and deducted points are not negotiable. Never assume that your teacher can read your mind.

Graphs are to be drawn using rulers and proper scaling mechanism. Labeling information used in graphing must be accompanied with the graph.

Provided spaces for question on exams must be large enough to fit your work and answer. If you are unable to fit your work in those spaces, please email me and let me provide you with extra large spaced version of the exam.

Due to time restrictions I am unable to grade unorganized exams.

**Sample TEST:**

- All grading materials should be returned in about a weekend period.
- Returned Materials not picked up by the owner( or owner's confidential classmate ), will be archived for only one week period and they will be discarded afterward.
- The only collected document that won't be returned to student is the FINAL EXAM.
This is a 16-week course. A 16-week course means 16 weeks of unstoping hard work toward a fair and acceptable achievements of all listed course outcomes. (Last three weeks of the semester is the most crucial time of the semester.)

A successful classroom is a combination of entities working in the spirit of goupwork away from all sort of “POLITICS”. It is an act of utmost courage to accept our shortfalls.

Remember: No one can claim to be perfect. I can learn from your productive criticism as you are going to learn math 125 from me.

When you ask questions, you keep your class actively alive. There is a beauty to be in a class that every element in it works toward true spirit of something that gathered us all together.

Scientifically speaking,

\[ \text{MATHEMATICS} = \text{PRACTICE ME MORE} \]

and

\[ \text{Question? = ASK!} \]

**QUizzes** (5% of the Final Grade, 5 minutes for each question)

Student will be asked to answer at most 2 questions of your choice from a pool of problems. Questions are selected from HW and lecture problems. Homework assignments that you asked me to explain during previous class sessions are the targeted quiz problems and you will see the similar versions on quizzes.

You will receive two pieces of papers on each quiz, question sheet and answer sheet. Your grade on quiz is based on right (credit) and wrong (no credit) answers. Only answer sheet will be collected for grading. The question sheet stays with you as of the upcoming sample test.

Quiz Objectives:

- encourage students being ontime and stay focused for the entire session,
- encourage students in active participation and full engagement,
- providing you with more TEST content materials,
- showing whether you had enough practice on the last session's emphasized topics,
- keeping track of your performance during semester, and
- To make an educational decision about your overall evaluation on the final roster.

If you learn questions given on quizzes, I promise a grade of A for your TESTs. If this is not the case, you are absolutely welcomed to challenge my word. I am open to your criticism and I am responsible for my word.

**Homework** (10% of the Final Grade)

Your success or failure in any math course is the result of your approach to the homework segment of the course.

Please meet the deadline for each assigned homework. Late homework is not acceptable and it won't be collected. However you are required to complete your homework for the end of semester partial credit opportunities.

There are many resources available in and outside the campus to assist you with the homework. Please consider spending some time in HLRC to get help from your classmates and tutors on completing your assignments.

Your Homework will be graded based on the following seven rules:

1. Well organized solution to every assigned problem. (No credit for partially solved assigned problems.)
2. All assigned problems must be explicitly shown on your homework with order. If you decide to skip any, there should be enough space to solve it later. (No credit for lack of it.)
3. Clearly separated work and final answer. (−5 if not.)
4. Well addressed and boxed final answers. (To address problem number 13 from section 5.3 write \( \frac{13}{5} \). (−5 if not)
5. Problems must be separated with a decent amount of space so you can embed corrections if required. (−5 if not)
6. Graphs must be accurate and unless otherwise specified, all calculations must be done with complete accuracy. Only final answer can be rounded to three decimal places. (−5 for lack of it.)
7. Your final answers must match with the correct answers available to students for the odd numbers. (−5 if not.)
Homework is being checked randomly and checked problem(s) will be chosen randomly. If I declare about collecting homework, you need to provide me with the page(s) containing requested problem(s). If your homework is not ready, please write your reason (excuses) on a piece of paper and turn it in (Otherwise you will be considered absent). Your score will be determined on bases of above rules. Any deduction applied to your homework will be reasoned by the rule number (1 – 7), so you can correct the fault in your next homework.

**DEPARTMENTAL FINAL EXAM** (30% of the Final Grade, 40 Multiple-Choice questions)

**Thursday, June 4, 2015**  time 7:00 – 9:00 pm

FINAL is comprehensive which means questions are from all topics we cover in this class. Questions on final exam are top secret. It is always a common practice for Math departments to embed questions at the level of basic arithmetic, pre-algebra and elementary algebra. Students are strongly advised to start studying for the final exam from week midterm. Missing Final Exam will result in failing the course.

The purpose of having departmental final exam is to monitor the class, including instructor, for the correct coverage of all topics as well as the quality of the coverage. The department understands that a qualified “to pass” student must be able to score a passing grade for the final exam.

**NO MAKEUP EXAM POLICY** (“I had a devastating family emergency, CAN I Make up my Missed ??????”)

Any missed assignment (Final, TEST, Quiz, Homework) will be counted 0 credit.

Missing “one” TEST score, proven to be legitimate, will be replaced with your final exam score.

Two lowest quizzes will be dropped.

Unfortunately, I am unable to make any more accommodations for students missing homework deadlines. You can submit your missed HW on the day of final to get some partial credit.

**STUDENT PERFORMANCE REPORT** (What is my CURRENT grade?)

Please use the following simple expression to estimate your current status in this class regarding your stance and score whereabouts.

\[
\text{(Average of TESTs)} \times 0.85 + \text{(Average of Quizzes)} \times 0.05 + \text{(Your estimation of current HW status)} \times 0.10
\]

Above estimation is within one letter grade accuracy, however, you have better understanding of your situation, your weakness and your strength in this course.

**GRADING:**

- Homework 10
- Quizzes 5
- Tests 55
- Final Exam 30

**SCALE:**


**IN AND OUT OF CLASS ACTIVITIES:**

- Pre-study the upcoming lecture. Write down all your questions and ask me if they have not been addressed yet.
- Take your assignments very seriously and complete your assigned work on time. Deadlines and all due dates are set to be observed without exception. If you are planning for a successful semester, you cannot afford to miss even one deadline stated in your schedule.
- Expect to spend at least **FOUR hours** per day studying textbook, class materials, and HW. Exact adjustment of required hours will be perceived later during the semester.
- Please take a realistic look to your schedule. Make sure that you truly have time to dedicate to the course and semester.
- Although the role of HW in student’s success is irrefutable, your active presence on every single session can be as much vital. Missing, though partially, a class puts student in disadvantage and the recovery from shortfalls frustrating. Keep your seat warm by your presence.
- Take advantage of instructor’s office hours. Office hours are arranged times that you can see me in person to ask about your questions and any course related matters. Try it! There won't be any regret, promise!
• Math Lab located on the first and second floor of HLRC needs to be filled and reconstructed by all students. Grab a table with your classmates or just be yourself and bug tutors for stealing guide on your questions. You can help others too!
• **Math Study Room** located at MSB 217 invites individuals or study groups to participate in their offered help under the supervision of an instructor. This is a perfect opportunity to meet another teacher for the same subject.
• Group study works!! Make your own study team with your classmates and work together not only outside the classroom but also in class activities.

After each exam (TEST/QUIZ) you must work on exam questions and answer to all questions. Keep the exam and their solutions together in your assignment binder in chronological order. Quizzes and Tests are your sample final exam.

**ATTENDANCE:**

Unless there is a documented and acceptable reason, **TEN hours** absence from the class time would entitle the student to be **excluded** from the class. It is your responsibility to drop the course. Being **late** or leaving **early** is considered half-absence. Please INITIAL in front of your name upon entering and leaving the class in attendance sheet. Late students are welcomed to take the first available seat close to the door. **College’s rules for Withdrawal are to be enforced without any exception.** Please be advised that:

No absence excuses a student from making up the work missed.

Student is responsible for the announcements made in class at the time of absence.

**CLASS COMPORTEMNT:**

As a matter of courtesy, arrive before 7:15 pm and stay for the entire session.

Plan for Three hours in each session to stay and work with me in class. Restrict your phone calls, and all other needs to 15 minutes break time that we are directed to hold.

Be attentive and focused for the entire session. Your participation is mandatory and will be graded accordingly.

Turn off all communication means and devices. Students are not allowed to take their phone calls, pages, emails, and any outside communications in or during the class session.

Participate in class discussion, have full involvement in the subject, and be respectful of others’ right.

Any cheating which includes unauthorized cooperation on any graded assignments will be directly reported to responsible entities and the exam will be discarded. Please refer to the **LACCD Code of Academic Conduct** for more information about actions taken in this circumstances. Any infringement upon the rights of others will not be tolerated as well.

Students are allowed to drink water in class. Please do not bring edible items in class.

**Break time:** **8:30 – 8:45 PM**. Please remind me about the break time.

**DISABILITY POLICY:**

Heldman Learning Resources Center (HLRC) DSP&S opens doors for students with special physical, communication or learning needs. DSP&S is located on the First Floor of HLRC. Please contact the center for any special consideration. I accommodate all necessities you might need in this regard upon receiving the required direction from the center. Please contact (310) 287-4450 for more information.

**IMPORTANT DATES:**

<table>
<thead>
<tr>
<th>Deadlines:</th>
<th>Holidays (Campus is closed):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply for Pass/No Pass, March 13</td>
<td>Final Grades due on June 7, 2015</td>
</tr>
<tr>
<td>Drop classes with a refund Feb. 22</td>
<td>Feb 13, 16; March 31, April 4-10, May 25, May 28</td>
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<tr>
<td><strong>Drop classes with a &quot;W&quot; May 10</strong></td>
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</table>

**CLASS STRUCTURE:**

Sign in and sign out. Students with a **perfect** attendance will be granted by 2 points extra credit. If attendance sheet is not available then you are present. We will start by 15 minutes of Q&A. Please write your questions on a piece of paper and hand it in. The class will continue with the lecture using whiteboard, projector, calculator and group work. Quiz can be given at any time of the class period.

**Course Exit Expectations**

Upon successful completion of Math 125 student is able to:

• Simplify advanced numerical and algebraic expressions involving multiple operations
• Solve linear, quadratic, rational and absolute value inequalities, graph their solution sets, and express the answer in interval notation
• Solve linear equations for a designated variable
• Apply algorithms of completing the square, rationalizing the denominator, and long division and synthetic division of polynomials
• Solve linear, quadratic form, simple cubic, radical, rational, absolute value, elementary exponential, and elementary logarithmic equations
• Solve systems of linear equations in three variables using matrix row reduction
• Graph the solution sets of systems of linear and quadratic inequalities
• Perform operations on complex numbers
• Perform operations on functions including composition of two functions and determine the domain of the resulting function
• Use proper mathematical notation to evaluate functions and obtain their inverses
• State and apply the fundamental properties of exponents and logarithms
• Demonstrate knowledge of standard vocabulary associated with graphing, including but not limited to slopes of lines, intercepts, vertex of parabola, asymptotes, and interplay between graph and functional notation
• Given its graph, determine whether a relation is a function and whether it is one-to-one, and determine its intercepts and domain and range
• Graph using horizontal and vertical translations and determine the domain and range of linear, quadratic, simple cubic, radical, reciprocal, absolute value, exponential and logarithmic functions
• Graph circles and parabolas using horizontal and vertical translation
• Evaluate simple expressions involving summation notation
• Set up and solve practical applications of the algebraic material

Disclaimer:

Your instructor, Jilbert Gharamanians, is the responsible entity for the content of this syllabus. Any discretionary changes must be done by his permission only.

As an instructor in this class I am DIRECTED to hold all the evaluations (TEST and FINAL EXAM) according to the standard of the Mathematics Department Policy.

Recommended homework assignments are for grading purpose and they will be collected by random. This means that the assignments are not necessarily enough to understand the targeted concepts. If you have difficulty, please try more of the exercises.

Internet Resources

West Los Angeles College ............... www.WLAC.edu
WolframAlpha ....................... http://www.wolframalpha.com/
Purple Math ......................... http://www.purplemath.com/
Math TV .............................. http://www.mathtv.com/
Khan Academy ..................... http://www.khanacademy.com

Please write the phone number and email address of at least three of your classmates in spaces provided here. Having some contact information from your classmates will help you during the semester.

• Name:                                                      Phone #:                                    email:
• Name:                                                      Phone #:                                    email:
• Name:                                                      Phone #:                                    email:

I, __________________________________ , read and completely understood the content of this syllabus. If there are questions or disagreement with the content, I will contact the author, Jilbert Gharamanians, before 2/12/2015.

Your Initials: ______
<table>
<thead>
<tr>
<th>Week</th>
<th>Tuesday</th>
<th>Thursday</th>
</tr>
</thead>
</table>
| 1st Week | Lecture Ch1; 2.1  
HW 1.1; 1.2; 1.3; 1.4; 2.1 | Lecture 2.2, 2.3, 2.4  
HW 2.2; 2.3; 2.4 |
| 2nd Week | Lecture 2.5, 2.6, 2.7  
HW 2.5, 2.6, 2.7 | Lecture 3.1, 3.2, 3.3  
HW 3.1, 3.2, 3.3  
Drop Class with Full Refund and without “W” – Feb 20 |
| 3rd Week | Lecture 3.4, 3.5, 3.6  
HW 3.4, 3.5, 3.6 | TEST #1; Chapter 1, 2, 3  
Lecture 4.1, 4.2  
HW 4.1, 4.2 |
| 4th Week | Lecture 4.3, 4.4, Appendix A  
HW 4.3, 4.4, Appendix A | Lecture 5.1, 5.2, 5.3  
HW 5.1, 5.2, 5.3 |
| 5th Week | Lecture 5.4, 5.5, Appendix B  
HW 5.4, 5.5, Appendix B | TEST #2; Chapters 4, 5  
Lecture 6.1  
HW 6.1 |
| 6th Week | Lecture 6.2, 6.3, 6.4  
HW 6.2, 6.3, 6.4 | Lecture 6.5, 7.1  
HW 6.5, 7.1 |
| 7th Week | Lecture 7.2, 7.3, 7.4  
HW 7.2, 7.3, 7.4 | Lecture 7.5, 7.6  
HW 7.5, 7.6 |
| 8th Week | Holiday | TEST #3, Chapters 6, 7  
Lecture 8.1, 8.2  
HW 8.1, 8.2 |
| 9th Week | Spring Break | Spring Break |
| 10th Week | Lecture 8.3; 8.4  
HW 8.3; 8.4 | Lecture 8.5, 8.6  
HW 8.5, 8.6 |
| 11th Week | Lecture 8.7, 9.1  
HW 8.7, 9.1 | Lecture 9.2, 9.3  
HW 9.2, 9.3 |
| 12th Week | Lecture 9.4, 9.5, 9.6  
HW 9.4, 9.5, 9.6 | Lecture 9.7, 10.1  
HW 9.7, 10.1 |
| 13th Week | TEST #4, Chapters 8, 9  
Lecture 10.2, 10.3  
HW 10.2, 10.3 | Lecture 10.4, 10.5  
HW 10.4, 10.5  
Drop Class with a “W” – May 8 |
| 14th Week | Lecture 10.6, 11.1  
HW 10.6, 11.1 | Lecture 11.2, 11.3  
HW 11.2, 11.3 |
| 15th Week | Lecture 11.4, 11.5  
HW 11.4, 11.5 | Lecture 12.1, 12.2  
HW 12.1, 12.2 |
| 16th Week | TEST #5, Chapters 10, 11  
Lecture 12.3, 12.4  
HW 12.3, 12.4 | Final Exam Review |
| 16th Week | Review Final Exam | Departmental FINAL Exam  
Please bring Scantron (count2); No 2 Pencil, eraser |
Q.4: Solve.
\[ \log_2(x-1) - \log_2(x+2) = 2 \]
\[
\frac{\log (x-1)}{\log (x+2)} = 2 \\
x-1 = 2(x+2) \\
x-1 = 4x + 8 \\
x = -3 \\
\text{check } x = -3
\]
\[
\log \frac{-3 - 1}{2} X \\
\text{No Solution}
\]

Q.5: Solve.
\[
\left(\frac{1}{4}\right)^{x+1} = 8^x \\
4 = 8^x \\
-2(x+1) = 2x \\
-2(x+1) = 3x \\
-2x-2 = 3x \\
5x = -2 \\
x = \frac{-2}{5}
\]

Q.6: Solve.
\[
4x^2 + 3y^2 = 4 \\
6y^2 - 2x^2 = 3
\]
\[
\begin{cases}
4x^2 + 3y^2 = 4 \\
-2x + 6y^2 = 3
\end{cases}
\]
\[
15y^2 = 10 \\
y^2 = \frac{10}{15} \\
y = \pm \sqrt{\frac{2}{3}} \\
x = \frac{2}{\sqrt{3}} \text{ or } x = -\frac{2}{\sqrt{3}} \\
x = \frac{1}{2}, x = \pm \sqrt{\frac{3}{2}}
\]
Q.1: Prove that \( C(3, -6) \) is on the perpendicular bisector of segment \( AB \) where \( A(-4, -3) \) and \( B(6, 1) \).

Q.2: The equation of a circle is given by \( x^2 + y^2 + 4y = 0 \).
   a. Sketch the graph of the circle on the template provided.
   b. Write the equation of upper, lower, right and left semicircles.

Q.3: Solve the inequality. Express the solution using interval notation.
\[
\frac{(x^2+1)(x-3)}{x^2-9} \leq 0
\]

Q.4: The braking distance \( d \) (in feet) of a certain car traveling \( v \) mi/hr is given by the equation \( d = v + (v^2/20) \). Determine the velocities that result in braking distance of less than 75 feet.

Q.5: Solve \( 4x^4 + 25x^2 + 36 = 0 \).

Q.6: Find the values of \( x \) and \( y \), where \( x \) and \( y \) are real numbers.
\[
(2x - y) - 16i = 10 + 4yi
\]

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Please answer to 2 questions only.

MATH 7; SMC

QUIZ 2; 7/7/2014

LAST 4-DIGIT OF SID:
### Problem 17

\[
\begin{align*}
\frac{17}{8.1} & \quad x + y = 4 \\
\frac{x}{y} & \quad 0 \quad 4 \\
0 & \quad 4 \\
4 & \quad 0 \\
2 & \quad 2 \\
\end{align*}
\]

The system is consistent.

Solution: \((0, 4)\)

### Problem 19

\[
\begin{align*}
\frac{19}{8.1} & \quad x - 2y = 6 \\
\frac{x}{y} & \quad 0 \quad -3 \\
0 & \quad 6 \\
4 & \quad -1 \\
\end{align*}
\]

The system is consistent.

Solution: \((4, -1\frac{1}{2})\)
1.) Find the solution set for the inequality: \( |2x - 1| + 2 < 7 \)
   A.) \( x < -3 \)   B.) \( -3 < x < -2 \)   C.) \( -2 < x < 3 \)   D.) \( x > 2 \)

2.) Which shows the equation of a line, in slope-intercept form, that passes through the points \((2, 2)\) and \((-1, 3)\)?
   A.) \( y = 3x + 4 \)   B.) \( y = -\frac{1}{3}x + \frac{4}{3} \)   C.) \( y = -3x + 4 \)   D.) \( y = \frac{1}{3}x + \frac{4}{3} \)

3.) Given the equation \(3x - 2y = 5\) of a line, what is the slope and the \(y\)-intercept of this line?
   A.) \( m = \frac{3}{2}, b = \frac{5}{2} \)   B.) \( m = \frac{2}{3}, b = -\frac{5}{2} \)   C.) \( m = \frac{2}{3}, b = \frac{5}{2} \)   D.) \( m = \frac{3}{2}, b = -\frac{5}{2} \)

4.) If \((x, y)\) is the solution to the linear system:
   \[-3x + 5y = 1 \quad \text{then } x + y = ? \quad 9x - 3y = 5\]
   A.) \( x + y = 1.56 \)   B.) \( x + y = 1 \frac{13}{9} \)   C.) \( x + y = 1 \frac{14}{9} \)   D.) \( x + y = 1.44 \)

5.) For the function given by \( y = f(x) = 2x - 5 \), find the inverse function, \( f^{-1}(x) \).
   A.) \( f^{-1}(x) = \frac{1}{2}x - \frac{5}{2} \)   B.) \( f^{-1}(x) = \frac{1}{2}x - 2 \)   C.) \( f^{-1}(x) = \frac{1}{2}x + \frac{5}{2} \)   D.) \( f^{-1}(x) = \frac{1}{2}x + 2 \)

6.) If \((x, y, z)\) is the solution to the linear system:
   \[2x - 3y + z = -9 \quad x + y + z = ? \quad 2x - 3y = 7 \quad \text{then } x + y + z = ? \]
   A.) \( x + y + z = 4 \)   B.) \( x + y + z = 1 \)   C.) \( x + y + z = 0 \)   D.) \( x + y + z = -1 \)

7.) Worldwide carbon dioxide \( CO_2 \) emissions have increased from \( 14 \) billion tons in 1970 to \( 26 \) billion tons in 2000. Write a linear function that gives worldwide carbon emissions as a function of time since 1970, \( (t = 0) \). Use this function to predict the amount of \( CO_2 \) emissions in the year 2015. In 2015, the predicted amount of \( CO_2 \) emissions will be:
   A.) 112.5 tons   B.) 48 tons   C.) 115 tons   D.) 32 tons

8.) Which of the following graphs represent \( y \) as a function of \( x \), i.e., \( y = f(x) \)?
   \( i. \) \( ii. \) \( iii. \)

9.) Graph the solution set of the system of linear inequalities:
   \[2x - y > 1 \quad x + 2y < 4\]
   A.) \( B. \) \( C. \) \( D. \)

10.) Find the \( x \)-intercepts of the function \( y = f(x) = x^2 - 6x + 7 \).
    A.) \((3 + \sqrt{2}, 0)\) and \((3 - \sqrt{2}, 0)\)   B.) \((3 + \sqrt{2}, 0)\) and \((3 - \sqrt{2}, 0)\)   C.) \((2 + \sqrt{6}, 0)\) and \((2 - \sqrt{6}, 0)\)   D.) \((4, 1, 0)\) and \((1, 5, 7, 0)\)

11.) Solve the equation \( x^2 - 4x + 13 = 0 \)
    A.) \( 2 \pm 6i \)   B.) \( 2 \pm 3i \)   C.) \( 2 \pm \sqrt{3}i \)   D.) \( 2 \pm 2\sqrt{17} \)

12.) Solve the equation \( 2x^4 - 14x^2 - 2x = 0 \), and the roots together and select the sum of the roots from the possibilities given.
    A.) \( \frac{8}{15} \)   B.) \( 1 \)   C.) \( \frac{7}{12} \)   D.) \( 0.41 \)

13.) A manufacturer of camera lenses estimates that the average monthly cost of production is given by the function \( C(x) = 0.1x^2 - 30x + 2000 \), where \( x \) is the number of lenses produced each month. Find the number of lenses the company should produce in order to minimize the average cost.
    A.) \( 25 \)   B.) \( 100 \)   C.) \( 75 \)   D.) \( 50 \)

14.) For the graph of the quadratic function \( f(x) = 2x^2 - 2x + 3 \), what is the correct equation for the axis of symmetry?
    A.) \( x = \frac{9}{4} \)   B.) \( x = \frac{1}{4} \)   C.) \( y = \frac{9}{4} \)   D.) \( y = \frac{1}{4} \)

15.) What is the domain of the rational function \( f(x) = \frac{x}{x^1 - 2x^2 + 3x} \)?
    A.) \( \{x \neq 0, 3\} \)   B.) \( \{x \neq 2, 3\} \)   C.) \( \{x \neq 3, 1, 3\} \)   D.) \( \{x \neq \frac{2}{3}, \frac{1}{2}, 1\} \)

16.) Solve the equation: \( x^2 + x - 2 = 0 \). Add the root(s) together and select their sum from the options below.
    A.) \(-1\)   B.) \( 5 \)   C.) \(-3\)   D.) \(-5\)

17.) Simplify the complex fraction:
    \( \frac{x - 1}{x - 2} = \frac{x - 2}{x - 2} \)
    A.) \( \frac{x - 1}{x - 2} \)   B.) \( \frac{x - 2}{x - 2} \)   C.) \( \frac{1}{x - 2} \)   D.) \( \frac{1}{x - 2} \)

18.) The intensity \( I \) of a light source is inversely proportional to the square of the distance \( d \) from the source. If the intensity is \( 48 \) lumens at a distance of \( 12 \) feet, what is the intensity at a distance of \( 6 \) feet?
    A.) \( 1.5 \) lumens   B.) \( 1 \) lumens   C.) \( 192 \) lumens   D.) \( 24 \) lumens

19.) Divide: \( \frac{x^2 - 4x + 3}{x^2 + 3x - 2} \)
    A.) \( x - 3 \)   B.) \( \frac{x^2 - 2x + 3}{x - 2} \)   C.) \( x - 2 \)   D.) \( x + 2 \)

20.) Subtract: \( \frac{x}{x + 4} - \frac{2}{x + 4} \)
    A.) \( \frac{x - 4}{x + 4} \)   B.) \( \frac{x - 4}{x + 4} \)   C.) \( \frac{x + 1}{x + 4} \)   D.) \( \frac{-4}{x + 4} \)

21.) Write \( \log_2(\frac{e^3}{e^2}) \) in expanded form.
    A.) \( \log(e^3) \)   B.) \( \log(e^3) - \log(e^2) \)   C.) \( \frac{3}{5} \log(\frac{e^3}{e^2}) \)   D.) \( \log(e^3) \)

22.) Graph \( y = f(x) = \log(x) \)
    A.) \( B.) \( C.) \( D.) \)

23.) Express \( \frac{1}{\log(x) + \log(y)} \) as a single logarithm.
    A.) \( \log(x + y) \)   B.) \( \log(x - y) \)   C.) \( \log(x + y) \)   D.) \( \log(x) \log(y) \)
24.) Write the logarithmic expression \( y = \log_b(x) \) in its equivalent exponential form.

A.) \( y = b^x \)  B.) \( y = \log_b x \)  C.) \( y = x^b \)  D.) \( y = x^b \)

25.) Solve \( 7 + 3^2 = 27 \) and round your answer to the nearest hundredth.

A.) \( x = 0.82 \)  B.) \( x = 2.73 \)  C.) \( x = 3 \)  D.) \( x = -0.82 \)

26.) Solve for \( x \): \( \log_2(x^2 - 2x) = 3 \)

A.) \( 4 \)  B.) \( 4, -2 \)  C.) \( 2 \)  D.) \( 2, -4 \)

27.) In a certain country, the number of people (in millions) below the poverty line can be modeled by \( P(t) = 20e^{0.05t} \) with \( t \) years since 2000. According to this model, how many people will be below the poverty line in 2025? Round your answer to the nearest million.

A.) 110 million  B.) 155 million  C.) 90 million  D.) 556 million

28.) In the formula \( A(t) = A_0(2)^{-t} \), \( A_0 \) is the amount of radioactive material present at any time, \( A(t) \) is the amount present at \( t = 0 \) and \( k \) is the half-life of the material. A sample of the radioactive element einsteinium contained 2 mg. Four hundred fifteen days later the sample contained 0.7 mg. What is the half-life of einsteinium in days?

Round your answer to the nearest whole number of days.

A.) 1613 days  B.) 297 days  C.) 274 days  D.) 629 days

29.) Rewrite \( \sqrt[3]{x} \) as an exponential expression.

A.) \( a^3 \)  B.) \( a^\frac{1}{3} \)  C.) \( a^\frac{1}{3} \)  D.) \( a^{\frac{1}{3}} \)

30.) Simplify: \( \sqrt[3]{125x^3y^3} \)

A.) \( 5xy \)  B.) \( 125x^3y \)  C.) \( 5xy \)  D.) \( 5x^3 \)

31.) Divide: \( \frac{4 - i}{3 + i} \)

A.) \( \frac{1}{3} \)  B.) \( \frac{20}{17} \)  C.) \( \frac{4 - i}{15} \)  D.) \( \frac{20}{17} \)

32.) An object is dropped from a tall tower. Find the distance the object has fallen when the speed reaches 320 ft/sec. Use the equation \( v = \sqrt{240t} \), where \( v \) is the speed of the object and \( t \) is the distance.

A.) 25 feet  B.) 625 feet  C.) 1600 feet  D.) 40 feet

33.) Solve the equation \( 4\sqrt{x} + 1 = 5 \). Add the roots or roots together and find the correct answer.

A.) \( \sqrt{2} \)  B.) \( \sqrt{2} \)  C.) \( \sqrt{2} \)  D.) \( \sqrt{2} \)

34.) For the function \( y = f(x) = \sqrt{x - 50} + 25 \), identify the correct domain of the function.

A.) \( (-\infty, 50) \)  B.) \( (50, \infty) \)  C.) \( (-\infty, 50) \)  D.) \( [25, \infty) \)

35.) Find the distance in the plane between the two points \((-\frac{1}{2}, 3)\) and \((2, -4)\).

A.) \( \sqrt{33} \)  B.) \( 2\sqrt{3} \)  C.) \( \sqrt{38} \)  D.) \( 2\sqrt{3} \)

36.) Salt Lake City, Utah, is 498 miles directly south of Helena, Montana, and is 1000 miles directly west of Omaha, Nebraska. What is the distance, rounded to the nearest mile, between Omaha and Helena?

A.) 902 miles  B.) 1,144 miles  C.) 1,518 miles  D.) 1,308,964 miles

37.) Sketch the graph: \( x^2 + y^2 - 6x + 4y + 4 = 0 \)

A.) \( x, y \)  B.) \( y, x \)  C.) \( x, y \)  D.) \( y, x \)

38.) Sketch the graph of \( 25x^2 - 4y^2 = 100 \)

A.) \( x \)  B.) \( y \)  C.) \( x \)  D.) \( y \)

39.) Solve the system:

\[
\begin{align*}
x^2 + 4y^2 &= 25 \\
x^2 - y^2 &= 5
\end{align*}
\]

A.) \((-3, 2)\) and \((3, 2)\)  B.) \((3, 2); (-3, 2)\)  C.) \((2, 3), (-2, -3)\) and \((-3, 2)\)  D.) \((3, 2)\) and \((-3, -2)\)

40.) Write the first three terms of the expansion of \((2x - y)^6\).

A.) \(64x^6 - 192x^5y + 240x^4y^2\)  B.) \(64x^6 - 32x^5y + 16x^4y^2\)  C.) \(64x^6 + 32x^5y + 16x^4y^2\)  D.) \(64x^6 + 192x^5y + 240x^4y^2\)
1. A solution of 60% fertilizer is to be mixed with a solution of 20% fertilizer to form 100 liters of a 40% solution. How many liters of the 60% solution must be used?

2. Train A leaves a station traveling at 40 miles per hour. Four hours later train B leaves the same station traveling in the same direction at 60 miles per hour. How long does it take for train B to catch up to train A?
   [A] 8 hr  [B] 9 hr  [C] 10 hr  [D] 11 hr

3. Solve \(|3x - 1| \geq 1\)
   \[ [A] \left\{ x \mid 0 \leq x \leq \frac{2}{3} \right\} \quad [B] \left\{ x \mid x < 0 \text{ or } x > \frac{2}{3} \right\} \quad [C] \left\{ x \mid x \leq 0 \text{ or } x \geq \frac{2}{3} \right\} \quad [D] \text{none of these} \]

4. Determine the equation of the line, in standard form, that contains the points \((\lambda, -7)\) and \((-4, -3)\)
   \[ [A] -4x - 3y = -37 \quad [B] -4x - 7y = 37 \quad [C] 7x - 4y = 37 \quad [D] -4x + 7y = -37 \]

5. Solve the system:
   \[ \begin{align*}
   3x - y &= 2s + 5 \\
   2x + y &= 4s + 6 \\
   2x - y &= 4s + 9 \\
   \end{align*} \]
   \[ [A] (2, 1, 0) \quad [B] (2, -1, 1) \quad [C] (2, -4, 6) \quad [D] \text{none of the above} \]

6. A coffee house blended 15 pounds of espresso flavored coffee beans with 5 pounds of vanilla flavored coffee beans. The 20 pound mixture cost $175. A second mixture included 6 pounds of espresso flavored coffee beans and 9 pounds of vanilla flavored coffee beans. The 15 pound mixture cost $126. Find the cost per pound of the espresso and vanilla flavored coffee beans.

7. Graph the solution set:
   \[ y \leq -x + 1 \quad \text{and} \quad y > 2 \]

8. \( \sqrt[3]{2^3 - 3x + 9} \times (x - 2) \)
   \[ [A] 2x^2 + 4x + 5 \quad [B] 2x^2 + x + 11 \quad [C] 2x^2 + x + 2 \quad [D] 2x^2 + 4x - 11 - \frac{16}{x - 2} \]

9. Solve by factoring:
   \[ 10x^2 + 13x = 3 \]
   \[ [A] \frac{3}{5} \quad [B] \frac{3}{5} \quad [C] \frac{3}{5} \quad [D] -\frac{3}{5} \]

10. Determine the domain of the function:
    \[ f(x) = \frac{4}{(x - 4)} \]
    \[ [A] [x | x \neq \pm 2] \quad [B] [x | x = 2] \quad [C] [x | x \neq 4, x \neq 0] \quad [D] [x | x \neq \pm 4, x \neq 0] \]

11. Simplify:
    \[ \frac{x + 1}{4x} \quad \frac{16x^2 - y^2}{2x^2 - 2x} \]
    \[ [A] \frac{4x^2 - y^2}{3x - 5} \quad [B] \frac{4x - y}{2} \quad [C] \frac{4x + y}{2x - 2} \quad [D] \frac{4x - y}{3x - 5} \]

12. Simplify:
    \[ \frac{1}{x + 3} \quad \frac{5}{x + 3} \]
    \[ [A] \frac{7}{x + 3} \quad [B] \frac{7}{2x - 9} \quad [C] \frac{7x + 9}{7} \quad [D] \frac{7x + 9}{2x - 9} \]

13. Simplify:
    \[ \frac{9}{3x + 1} \quad \frac{1}{x + 3} \]
    \[ [A] \frac{3x + 15}{x + 3} \quad [B] \frac{-3x}{-5x^2 - 14x + 3} \quad [C] \frac{15x + 3}{-5x + 15} \quad [D] \frac{-3x}{-4x + 12} \]

14. Solve:
    \[ 1 - \frac{4}{x} = \frac{16}{x^2 - 4} \]
    \[ [A] -6 \text{ or } -2 \quad [B] -2 \text{ or } 6 \quad [C] 6 \quad [D] \text{no solution} \]

15. At noon a horse and buggy headed north traveling 8 miles per hour. Two hours later, a roadster headed south from the same location driving 50 miles per hour. At what time will the horse and buggy be 132 miles from the roadster?
    \[ [A] 3:50 \text{ P.M.} \quad [B] 3:45 \text{ P.M.} \quad [C] 4:00 \text{ P.M.} \quad [D] 4:10 \text{ P.M.} \]

16. The price per person of renting a bus varies inversely with the number of people renting the bus. It costs $19 per person if 23 people rent the bus. How much will it cost per person if 39 people rent the bus? Round to the nearest cent.
    \[ [A] $14.30 \quad [B] $32.22 \quad [C] $11.21 \quad [D] $47.21 \]

17. Rewrite the exponential expression as a radical expression.
    \[ x^{\frac{3}{2}} \]
    \[ [A] \sqrt[3]{x^2} \quad [B] \sqrt[3]{x^2} \quad [C] \sqrt{x^3} \quad [D] \sqrt{x^2} \]
18. Determine the domain of the function \( f(x) = \sqrt{x - 5} + 4 \).
   - [A] domain \( \{x \mid x \geq 5\} \)
   - [B] domain \( \{x \mid x \geq 9\} \)
   - [C] domain \( \{x \mid x \geq 0\} \)
   - [D] domain \( \{x \mid x \leq 0\} \)

19. Graph: \( f(x) = \sqrt{x} - 1 \)
   - [A] graph (show graph)
   - [B] graph (show graph)
   - [C] graph (show graph)
   - [D] graph (show graph)

20. Solve. \( \sqrt{x + 14} = x - 16 \)
   - [A] 22
   - [B] 22, 11
   - [C] 11
   - [D] no solution

21. Simplify \( \frac{5 - 2x}{3x} \)
   - [A] \( \frac{5}{3x} - \frac{2}{x} \)
   - [B] \( \frac{5}{3x} \)
   - [C] \( \frac{5}{3x} - \frac{2}{x} \)
   - [D] \( \frac{5}{3x} \)

22. Solve using the quadratic formula. \( x^2 - 4x + 8 = 0 \)
   - [A] \( 2 + 2i, 2 - 2i \)
   - [B] \( 2 + 2i, 2 - 2i \)
   - [C] \( -2 + 4i, -2 - 4i \)
   - [D] \( 2 + 4i, 2 - 4i \)

23. Solve. \( x^2 - 18x + 77 = 0 \)
   - [A] 1, 7
   - [B] \( \pm 1, \pm 7 \)
   - [C] \( \pm 1, \pm 7 \)
   - [D] \( \pm 1, \pm 7 \)

24. When a rocket is shot into the air, its height \( h \) in feet above the ground, is a function of time \( t \), in seconds. The height of the rocket can be found using the formula \( h(t) = 176t - 16t^2 \).
   After how many seconds will the rocket be at a height of 448 feet?
   - [A] 4 and 7
   - [B] 4
   - [C] 11
   - [D] 3 and 8

25. Solve. \( x^2 + 7x = 18 \)
   - [A] \( x = -9 \leq x \leq 2 \)
   - [B] \( x = -2 \text{ or } x = 9 \)
   - [C] \( x = -9 \text{ or } x = 2 \)
   - [D] \( x = -2 \text{ or } x = 9 \)

26. Find the graph of the equation. \( f(x) = x^2 - 2x - 1 \)
   - [A] graph (show graph)
   - [B] graph (show graph)
   - [C] graph (show graph)
   - [D] graph (show graph)

27. For the pair of functions, find \( f(x)g(x) \),
   \( f(x) = x - 6, g(x) = \sqrt{x + 5}; x \geq -5 \)
   - [A] \( \sqrt{x + 5} - 5 \)
   - [B] \( \sqrt{x + 5} \)
   - [C] \( \sqrt{x + 5} - 5 \)
   - [D] \( \sqrt{x + 5} - 5 \)

28. Which of the following are one-to-one functions?
   - [i] \( y \) is a one-to-one function.
   - [ii] \( y \) is not a one-to-one function.
   - [iii] \( y \) is a one-to-one function.
   - [iv] \( y \) is not a one-to-one function.

29. Find the inverse of the function. \( y = f(x) = 5x - 2 \)
   - [A] \( f^{-1}(x) = \frac{x + 2}{5} \)
   - [B] \( f^{-1}(x) = \frac{x - 5}{5} \)
   - [C] \( f^{-1}(x) = \frac{x + 2}{5} \)
   - [D] \( f^{-1}(x) = \frac{x - 5}{5} \)

30. Identify the graph of the function. \( f(x) = 4^x + 3 \)
   - [A] graph (show graph)
   - [B] graph (show graph)
   - [C] graph (show graph)
   - [D] graph (show graph)

31. Identify the logarithmic expression written in exponential form. \( \log_a \frac{1}{27} = -3 \)
   - [A] \( 3^a = -27 \)
   - [B] \( 3^a = \frac{1}{27} \)
   - [C] \( 3^a = \frac{1}{27} \)
   - [D] \( 3^a = -27 \)

32. Find the equivalent form of the logarithmic expression. \( \log_a x^4y^2 \)
   - [A] \( \log_a x + 4 \log_a y - 3 \log_a z \)
   - [B] \( \log_a x + 4 \log_a y - 3 \log_a z \)
   - [C] \( \frac{\log_a x + 4 \log_a y}{3 \log_a z} \)
   - [D] none of these
33. Identify the graph of the logarithmic function: \( f(x) = \log_3(x-1) \)

34. \( 67^{x-3} = 36 \)  
   [A] -0.1663  
   [B] -0.2925  
   [C] 0.5075  
   [D] -0.2295

35. \( \log_3(x-1) - \log_3(x-4) = \log_3 4 \)  
   [A] 0  
   [B] 5  
   [C] 1  
   [D] -1/3

36. The number of bacteria present in a culture after \( t \) minutes is given as \( B = 100e^t \). If there were 1031 bacteria present after 4 minutes, find \( t \).
   [A] 18.533  
   [B] 1.147  
   [C] 4.616  
   [D] 1.159

37. Identify the standard form of the equation of the circle: \( x^2 + 12x + 36 - 3y + 27 = 0 \)
   - [A] \( (x-6)^2 + (y-2)^2 = \sqrt{33} \)  
   - [B] \( (x+2)^2 + (y-6)^2 = 13 \)  
   - [C] \( (x+2)^2 + (y-6)^2 = \sqrt{13} \)  
   - [D] \( (x+6)^2 + (y-2)^2 = 13 \)

38. Identify the graph of the ellipse given by the equation: \( \frac{x^2}{25} + \frac{y^2}{36} = 1 \)

39. Solve the system:
   \( 4x^2 + 3y^2 = 147 \)
   \( 5x^2 + 3y^2 = 183 \)
   [A] \( (6, 1), (6, -1), (-6, 1), (-6, -1) \)  
   [B] \( (1, 5), (-1, -5), (-1, 5), (-1, -5) \)  
   [C] \( (1, 5), (1, -5) \)  
   [D] no real solution

40. Write in expanded form:
   \( (a - 2b)^4 \)
   [A] \( a^4 - 8a^3b + 12a^2b^2 - 8ab^3 + 16b^4 \)  
   [B] \( a^4 - 8a^3b + 24a^2b^3 - 32ab^4 + 16b^4 \)  
   [C] \( a^4 + 8a^3b + 24a^2b^3 + 32ab^4 + 16b^4 \)  
   [D] \( a^4 + 8a^3b + 12a^2b^2 + 8ab^3 + 16b^4 \)
Math Department
Final Exam Math 125

Do NOT write in booklet.
Do all work on scratch paper. Put answers on scantron. NO CELL PHONES ALLOWED.

Good Luck

Version B  TEST#: 

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) \( \sqrt{\frac{1}{a} \cdot b^2} \)
   \( A) \ x^1 \frac{1}{4} \quad B) \ \frac{1}{x^1 \frac{1}{4}} \quad C) \ x^1 \frac{1}{4} \quad D) \ \frac{1}{x^1 \frac{1}{4}} \)

MATCH THE EQUATION WITH ITS GRAPH.

2) \( \frac{y^2}{9} + \frac{x^2}{4} = 1 \)
   \( A) \quad B) \quad C) \quad D) \)

3) \( x^2 + y^2 + 2x - 4y - 44 = 0 \)
   \( A) \ (-2, 1); r = 49 \quad B) \ (-1, 2); r = 7 \quad C) \ (1, -2); r = 49 \quad D) \ (2, -1); r = 7 \)