## Course SLO Assessment Report - 4-Column

**El Camino College**

### El Camino: Course SLOs (MATH) - Developmental Math

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<tr>
<td>El Camino: Course SLOs (MATH) - Developmental Math - ECC: MATH 12 - Basic Arithmetic Skills - SLO #2 Solving Equations and Manipulating Expressions - Students will be able to use numerical and symbolic representations to correctly perform operations (addition, subtraction, multiplication, division, exponentiation, factoring, and order of operations) on non-negative real numbers to simplify expressions. (Created By El Camino: Course SLOs (MATH) - Developmental Math)</td>
<td><strong>Assessment Method Description:</strong> The planned SLO is a common topic in arithmetic: Order of Operations. An arithmetic problem with 5 operations was presented to students; they were given points based on the proportion of operations they performed in the correct order.</td>
<td></td>
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<tr>
<td><strong>Course SLO Assessment Cycle:</strong></td>
<td><strong>Assessment:</strong> Solve by describing each step following the proper order of operations:</td>
<td><strong>09/01/2014 - Math 12 Sp14</strong></td>
<td><strong>Action Category:</strong></td>
</tr>
<tr>
<td>2013-14 (Spring 2014)</td>
<td>28 - 3( 15 ÷ 5 - 1 )3</td>
<td>Pass SLO 206</td>
<td>Teaching Strategies</td>
</tr>
<tr>
<td><strong>Input Date:</strong></td>
<td>Step 1:</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>11/20/2013</td>
<td>Step 2:</td>
<td>235</td>
<td></td>
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<tr>
<td><strong>Course SLO Status:</strong></td>
<td>Step 3:</td>
<td></td>
<td></td>
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<tr>
<td>Active</td>
<td>Step 4:</td>
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<td></td>
<td>Step 5:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Final Answer: 28 - 3( 15 ÷ 5 - 1 )3 = ______</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Assessment Method:</strong></td>
<td><strong>Standard and Target for Success:</strong> Standards or Rubric</td>
<td><strong>CourseTotal</strong></td>
<td>12/01/2014 - Distribute to instructors</td>
</tr>
<tr>
<td>Exam/Test/Quiz</td>
<td>3 points The solution is completely correct in its entirety and the student has demonstrated a full understanding of the concepts involved</td>
<td><strong>Pass SLO</strong> 0.60</td>
<td>AMATYC standards and guidelines for math instruction</td>
</tr>
<tr>
<td><strong>Standard and Target for Success:</strong> Standards or Rubric</td>
<td>(a) used notation correctly</td>
<td><strong>Not Pass SLO</strong> 0.17</td>
<td></td>
</tr>
<tr>
<td>2 points The solution demonstrates some conceptual understanding of the skill or concept involved, but has not thoroughly mastered it. One or more major errors are present in the solution:</td>
<td>(b) has clearly shown all the steps</td>
<td><strong>Total</strong> 0.77</td>
<td></td>
</tr>
<tr>
<td>1 points The solution demonstrates minimal conceptual understanding of the skill or concept involved. One or more major errors are present in the solution:</td>
<td>(c) made no algebraic errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) not completely answering the question</td>
<td>0.08</td>
<td></td>
<td></td>
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<tr>
<td>(b) not using consistent notation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) making multiple errors in computation</td>
<td>0.31</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Faculty Contributing to Assessment:</strong></td>
<td><strong>Related Documents:</strong></td>
<td><strong>SLO SP14 MATH 12.xls.doc</strong></td>
<td></td>
</tr>
<tr>
<td>G. Scott, V Tim, B Bayssa, T Huang, W Chen, V Avakyan, A Yu, J Gill, G manikandan, D Roach, O Avanassian</td>
<td><strong>SLO/PLO Assessment Process</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results are generally positive: 60% of students passed the SLO and the course which is a decent outcome, more impressive is that 69% of all students passed the SLO regardless of their grade in the course, and what is also encouraging is that only 15% of students failed both SLO and the course.

There is room for improvement, but these results are not bad and this seems to be a topic most students are mastering.

**Standard Met? :** Yes

**Semester and Year Assessment Conducted:** 2014-15 (Fall 2014)

**Faculty Assessment Leader:** Art Martinez

**Related Documents:**
### El Camino: Course SLOs (MATH) - Developmental Math - ECC: MATH 23 - Pre-Algebra - SLO #2 Solving Equations and Manipulating Expressions - Students will use numerical and symbolic representations of mathematical ideas to simplify linear expressions and solve linear equations. (Created By El Camino: Course SLOs (MATH) - Developmental Math)

#### Course SLO Assessment Cycle:
2013-14 (Spring 2014)

#### Input Date:
11/20/2013

#### Course SLO Status:
Active

### Assessment Method Description:

<table>
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<tr>
<th>Sample Question:</th>
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<tr>
<td>Given:</td>
</tr>
<tr>
<td>(i) 4x +3 – 8</td>
</tr>
<tr>
<td>(ii) 4x +3 = 8</td>
</tr>
</tbody>
</table>

A) Which of the above is a linear equation? Which is a linear expression?
B) Simplify the linear expression.
C) Solve the linear equation.

### Assessment Method:

- **Exam/Test/Quiz**

### Standard and Target for Success:
Based on the rubric below, it is expected that 70% of the students will score 2 or 3 on this SLO.

### GRADING RUBRIC (problem worth a maximum of 3 points):

<table>
<thead>
<tr>
<th>Part (A) (worth 1 point)</th>
<th>1 point (student correctly identifies which is an expression and which is an equation)</th>
<th>0 points (student incorrectly identifies which is an expression and which is an equation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part (B) (worth 1 point)</td>
<td>1 point (student correctly simplifies the expression)</td>
<td>0 points (student makes mistakes simplifying the expression, or treats expression like an equation)</td>
</tr>
<tr>
<td>Part (C) (worth 1 point)</td>
<td>1 point (student correctly solves the equation)</td>
<td>0 points (student makes mistakes in solving the equation, or treats the equation like an expression)</td>
</tr>
</tbody>
</table>

### Results:

04/16/2014 - 23 of the 26 sections of Math 23 participated in this SLO (sections 0192, 0196, 9734 did not).

Here are the results:
- 605 students in total were assessed
- 54.9% (332) scored a 3
- 23.8% (144) scored a 2
- 12.9% (78) scored a 1
- 8.4% (51) scored a 0

Therefore, 78.7% of those surveyed scored a 2 or 3 on this SLO. This exceeds the target of 70%.

20 instructors were pleased with the results, while 3 were not.

**Standard Met? :**
Yes

**Semester and Year Assessment Conducted:**
2013-14 (Spring 2014)

**Faculty Assessment Leader:**
Megan Granich

**Faculty Contributing to Assessment:**

04/16/2015 - To raise the success target from 70% to 72%.

To do this, we should try to incorporate some of the suggestions from the participating instructors on how to improve the success rate for this particular SLO:

1. Clearly identify the difference between an expression and an equation. For several weeks it was a repeated discussion. I had them analyze problems as part of their classwork/homework in a manner similar to the SLO question.

2. Group work; constantly asking them to identify whether the problem is an equation or an expression.

3. Go over how an equation has an equal sign because the both start with 'equa.' Thus, an expression does not have an equal sign.

4. Student practice (in class and home), and periodic in-class review worksheets

5. When solving linear equations, I taught my students to write out the steps that they are doing, such as adding and subtracting to balance the equations. Keeping track of which step of the process the student is doing gives them a guide for solving the problem.

6. Numerous instructors commented on lack of attendance contributing to not only poor SLO results, but poor results in Math 23 as a whole. This is something that we should look to improve. One instructor mentioned...
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<tr>
<td>El Camino: Course SLOs (MATH) - Developmental Math - ECC: MATH 37 - Basic Accelerated Mathematics - SLO #2 Solving Equations and Manipulating Expressions - Students will be able to use numerical and symbolic representations of mathematical ideas to simplify linear and quadratic expressions, and to evaluate linear and quadratic expressions and to solve linear equations and quadratic equations. (Created By El Camino: Course SLOs (MATH) - Developmental Math)</td>
<td><strong>Assessment Method Description:</strong> Math 37 includes an online component where students are required to complete quizzes via the My Math Lab Pearson Publishing software. The Spring 2014 SLO was assigned as an online exam with 9 linear equation problems using integer and rational coefficients. The 9 problems are given below: Solve for x: 1. - 9 = x + 7 2. -8x - 4x = -7 3. x + 5y = 20 4. 7x = 33 + 4x 5. 6 - 4x = -8x + 18 6. 5x - 7 - 3x = 3x - 2 7. 5(5x - 3) + 10 = -3 8..(x + 2) + 4 = 5(x + 3) + 6 9. (x - 7)/3 = 1 - x/7</td>
<td><strong>05/11/2014 -</strong> We considered a passing grade to be the case where a student correctly answered 6 of the 9 problems in the SLO. <strong>Results:</strong> a) 73% of our students correctly answered 6 of the 9 problems. b) the average grade was a 72%, the median was 78% c) 137 students were surveyed d) the standard deviation was 20% e) 12% of our students received a score of 100%</td>
<td>starting a sign-in sheet for their class and making it a point to drop students who have a &quot;habit of not showing up&quot;.</td>
</tr>
<tr>
<td>Course SLO Assessment Cycle: 2013-14 (Spring 2014)</td>
<td></td>
<td><strong>09/01/2014 -</strong> 812 students from 31 sections participated in this SLO assessment. 125 or 15.4% of the students scored a 0. 188 or 23.2% of the students scored a 1. 194 or 23.9% of the students scored a 2. 305 or 37.6% of the students scored a 3.</td>
<td><strong>09/01/2015 -</strong> Provide instructors (via email) with factoring worksheets that emphasize the AC method using either factoring boxes or factoring by grouping, instead of guess and check factoring.</td>
</tr>
</tbody>
</table>

**Action Category:** Teaching Strategies

**Faculty Assessment Leader:** Art Martinez

**Faculty Contributing to Assessment:** Alice Maritnez, Dominc Fanelli, Lars Kjeseth, Ruth Zambrano, Juan Ortiz, Jose Villalobos,

El Camino: Course SLOs (MATH) - Developmental Math - ECC: MATH 40 - Elementary Algebra - SLO #2 Solving Equations and Manipulating Expressions - Students will be able to use numerical and symbolic representations of mathematical ideas to simplify

**Assessment Method Description:** Solving Quadratic Equations by Factoring Please use a problem such as:

Solve for x:
3x^2 + 4x = 4

**Assessment Method:**
Exam/Test/Quiz

**Standard and Target for Success:**
Where the typical SLO is a single problem, we chose to assess 9 problems, where one included fractional coefficients and another problem included multiple variables. Considering the degree of difficulty of this SLO we felt a passing grade should be getting 6 of these 9 problems correct.

Our target for success was for 2/3 of our students to pass this SLO.

**09/01/2014 -** Provide instructors (via email) with factoring worksheets that emphasize the AC method using either factoring boxes or factoring by grouping, instead of guess and check factoring.
or solve linear, quadratic, rational, and radical expressions. (Created By El Camino: Course SLOs (MATH) - Developmental Math)

**Course SLO Assessment Cycle:**
2013-14 (Spring 2014)

**Input Date:**
11/20/2013

**Course SLO Status:**
Active

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### Course SLO Assessment Cycle: 2013-14 (Spring 2014)

**Input Date:**
11/20/2013

**Course SLO Status:**
Active

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**Assessment Methods & Standard and Target for Success / Tasks**

- **Exam/Test/Quiz**

**Standard and Target for Success:**
Grading: Please look for the following 3 key concepts when scoring
1. Sets equation equal to 0 before factoring
2. Factors correctly
3. Solves for x by setting each factor equal to 0

Students receive 1 point for completing each of the above. Please focus on overall understanding of the concepts.

| 0    | Blank or no relevant information |
| 1    | Completes One of the key concepts correctly |
| 2    | Completes Two of the key concepts correctly |
| 3    | Completes all Three of the key concepts correctly |

It is expected that 60% of Math 40 students will score 2 or 3 on this SLO.

**Related Documents:**
- SLO Instructions & Rubric

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**Action Category:**
Teaching Strategies

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**El Camino: Course SLOs (MATH) - Developmental Math - ECC: MATH 60 - Elementary Geometry - SLO #2 Solving Equations and Manipulating Expressions - Students will be able to calculate perimeter, area, surface area and volume for various 2D and 3D geometric shapes. (Created By El Camino: Course SLOs (MATH) - Developmental Math)**

**Course SLO Assessment Cycle:**
2013-14 (Spring 2014)

**Input Date:**
11/20/2013

**Course SLO Status:**
Active

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**Assessment Method Description:**
Surface Area/Volume

You have a plan to construct a water tank. The tank will be a cylinder that is 30 feet long and 8 feet in diameter. How much sheet metal will you need to construct the water tank?

1. Will you need to find surface area or volume to answer this question? Choose one.
2. Draw a picture (not to scale) that includes correct placement of the measures given in this problem.
3. Solve the problem.

**Assessment Method:**
Exam/Test/Quiz

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**Results**

- The percentage scoring a 2 or 3 was 61.5%
- Factoring with a leading coefficient other than 1 is a difficult topic for many students. Students who have not yet mastered factoring are not successful with this SLO. This SLO includes the additional requirement of solving quadratic equations. Almost 40% of all our students have mastered both concepts, as seen by earning a 3 on this SLO. Over 60% have mastered 2 of the key concepts in this SLO.

Solving quadratic equations is covered later in Math 40 using Completing the Square and/or Quadratic Formula. Also, Factoring and Solving Quadratic Equations are covered again in Math 73 or Math 80, so students will have more opportunities to completely master this topic before entering a transfer level math class.

**Standard Met?**
Yes

**Semester and Year Assessment Conducted:**
2013-14 (Spring 2014)

**Faculty Assessment Leader:**
Anna Hockman

**Faculty Contributing to Assessment:**

**Related Documents:**
- M40 S14 Assessment Resultsx.pdf

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<th>Results</th>
<th>Action &amp; Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard and Target for Success:</strong></td>
<td>Rubric for SLO #2 Assessment:</td>
<td>71% of the students that attempted the SLO passed the SLO with a score of 3 or 4. Only 3 students that passed the SLO did not pass the class. Although we are close to the target, it has not yet been met.</td>
<td></td>
</tr>
<tr>
<td>Objective: Demonstrate ability to identify &amp; correctly implement techniques to symbolically solve &amp; manipulate expressions.</td>
<td><strong>EXCELLENT:</strong> (3)</td>
<td><strong>Standard Met?</strong></td>
<td>No</td>
</tr>
<tr>
<td>• Correct choice of formula for solving problem</td>
<td><strong>Semester and Year Assessment Conducted:</strong></td>
<td>2013-14 (Spring 2014)</td>
<td></td>
</tr>
<tr>
<td>• Clear evidence of the student’s reasoning process</td>
<td><strong>Faculty Assessment Leader:</strong></td>
<td>Susie Tummers</td>
<td></td>
</tr>
<tr>
<td>• Correct picture with placement of measures</td>
<td><strong>Faculty Contributing to Assessment:</strong></td>
<td>Susie Tummers, Ashod Minasian</td>
<td></td>
</tr>
<tr>
<td>• Techniques used to solve problem clearly indicate student has an excellent understanding of concept.</td>
<td><strong>SATISFACTORY:</strong> (2)</td>
<td></td>
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<tr>
<td><strong>SATISFACTORY:</strong> (2)</td>
<td></td>
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<tr>
<td>• Correct choice of formula for solving problem</td>
<td><strong>TARGET:</strong> At least 75% of students in the class will obtain a score 3 or 4 on the given problem.</td>
<td></td>
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<tr>
<td>• Some evidence of the student’s reasoning process</td>
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<td></td>
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<tr>
<td>• Picture may contain an error in placement of measures</td>
<td></td>
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<tr>
<td>• Techniques used to solve problem indicate student has a satisfactory understanding of concept.</td>
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<tr>
<td><strong>NEEDS IMPROVEMENT:</strong> (1)</td>
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<tr>
<td>• Wrong choice of formula for solving problem</td>
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<td></td>
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<tr>
<td>• Little evidence of the student’s reasoning process</td>
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<td></td>
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<tr>
<td>• Picture may have major errors in placement of measures or picture is incorrect 3D object</td>
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<tr>
<td>• Techniques used to solve problem clearly indicate student has deficiencies in understanding the concept.</td>
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<tr>
<td><strong>UNSATISFACTORY:</strong> (0)</td>
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<tr>
<td>• Student did not choose either formula.</td>
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<tr>
<td>• No evidence of the student’s reasoning process</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>• No picture is drawn.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Techniques used to solve problem clearly indicate student does not understand the concept.</td>
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</tr>
</tbody>
</table>

**Assessment Method Description:**

The SLO assessment is a quiz including several problems. Problem 4 was used to assess SLO #2. See attached.

**Assessment Method:**

Exam/Test/Quiz

09/05/2014 - There were 90 students in four sections (0330, 0336, 0344, 0332) of Math 67 who took the SLO quiz in spring 2014. Six scored 0, 20 scored 1, 14 scored 2 and 49 scored 3. So 63/89, or 71% passed, which meets expectations. Of those who passed the course, about 84% passed the SLO, which indicates that

09/05/2015 - Our goal to increase the percentage of those passing the course who pass the SLO. We will make better use of student test corrections and student reflections on their exams as to what was correct and why and what

El Camino: Course SLOs (MATH) - Developmental Math - ECC: MATH 67 - General Education Algebra - SLO #2 Solving Equations and Manipulating Expressions - Students will be able to symbolically (algebraically) solve a variety of equations, inequalities and linear
### Course SLOs

- **El Camino: Course SLOs (MATH) - Developmental Math**

### Assessment Methods & Standard and Target for Success / Tasks

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<th>Standard and Target for Success:</th>
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<tr>
<td>It is expected that 70% of students will score 2 or better. The scale is 3-correct (excellent), 2-mostly correct (satisfactory), 1-some correct (less than satisfactory), 0-nothing correct.</td>
<td>understanding how to algebraically solve a variety of equations (SLO#2) is a necessary skill for passing the course. Additionally, about 59% of those passed the SLO did not pass the course, which indicates that the skill in SLO #2 is not by itself sufficient to pass the course.</td>
</tr>
</tbody>
</table>

### Related Documents:

- Quiz11_SLO_SP14.pdf

### Action & Follow-Up

- **Action Category:** Teaching Strategies

- **Action:** Raise the Target for Success to 70%

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El Camino: Course SLOs (MATH) - Developmental Math - ECC: MATH 80 - Intermediate Algebra for Science, Technology, Engineering, and Mathematics - SLO #2 Solving Equations and Manipulating Expressions - Students will be able to evaluate numerical operations and manipulate algebraic expressions involving rational and negative exponents, radicals, complex numbers, exponents and logarithms and be able to solve linear, quadratic, polynomial, rational, radical, absolute value, exponential and logarithmic equations and inequalities. (Created By El Camino: Course SLOs (MATH) - Developmental Math)

### Course SLO Assessment Cycle:
2013-14 (Spring 2014)

### Input Date:
11/20/2013

### Course SLO Status:
Active

#### Assessment Method Description:
There were two questions selected this semester; Instructors had the freedom to select either one. The first question involved the exponential growth of Chipotle restaurants. Students were told that there were 75 Chipotle restaurants in 1993, 675 in 1995, and that the number of Chipotle restaurants grow exponentially. Students were given the general exponential growth function and for part a) of the question they were asked to find an exponential function on ‘t’ number of years since 1990. For part b) students were asked to evaluate f(4) using their results from part a) and to interpret their results in a sentence format. Finally for part c) of the question students were asked to use their results from part a) to predict when the number of Chipotle restaurants will reach 10,000. The question given follows:

The number of Chipotle restaurants has grown exponentially. In 1993 there were 75 Chipotle restaurants and in 1995 there were 675. Let f(\(t\)=a·b^t) be the number of Chipotle restaurants at ‘\(t\)’ years since 1990.

1. Find an equation of f(t).
2. Evaluate f(4). What does it mean in this situation?
3. Predict in which year Chipotle reached 10,000 restaurants.

The second question involved the exponential growth of rodents in Los Angeles. Students were first given the general equation to model population growth. Then students were told that in 2014 the rodent population in Los Angeles was estimated to be 50,000; with an expectation that it will double every 4 years. For part a) of the question students were asked to find the value of the constant ‘K’ in the population growth formula. Then for part b) students were asked to use their results from part a) to predict when the rodent population was expected to be 100,000. Then for part c) students were asked to use their results from part a) to predict when the rodent population was expected to double.

#### Instructor comments:
One instructor responded: “I believe the results I observed were fairly strong for this SLO question. With 19/32 or 59% of students at complete or most understanding, I felt that despite there is room for improvement, I think a majority of Math 80 students to solve the problem mostly correct shows a fairly robust grasp of the concept and the algebra behind it.”

#### Summary:
Our results indicates that 220 of the 494 (44.53%) students either earned a perfect score or missed only 1 question; this result is below our target of 60%. As an important point of interest, some
reach 10 million. And finally, for part c) of the question students were asked to use their results from part a) to predict the rodent population in the year 2024. The question given follows:

If 'P' is the population at some time 't', $P_0$ is the initial population at $t = 0$, and $k$ depends on the rate of growth then, $P = P_0 e^{kt}$

The rodent population in Los Angeles is currently (2014) estimated at 50,000. If it is expected to double every 4 years;

a) Find the value of ‘k’ in the equation $P = P_0 e^{kt}$

b) In what year will the rodent population in Los Angeles reach 10 million?

c) What will be the rodent population in the year 2024?

Both questions involved exponential equations. Both questions contained three very similar subparts. Therefore, the rubric for both questions was the same. The Rubric for this assessment was on a scale of 0 to 3; where the score directly correlated to the number correct answers each student provided. If students correctly answered all 3 subparts they would earn a score of ‘3’. If students correctly answered 2 out of 3 subparts they would earn a score of ‘2’. If students correctly answered 1 out of 3 subparts they would earn a score of ‘1’. If students failed to answer any of the subparts correctly they would earn a score of ‘0.

Use the following rubric:
0 – No understanding = Student answered none of the parts a)-c) correctly
1 – Some understanding = Student answered 1 of the parts a)-c) correctly
2 – Much understanding = Student answered 2 of the parts a)-c) correctly
3 – Complete understanding = Student answered all of the parts a)-c) correctly

Assessment Method:
Exam/Test/Quiz

Standard and Target for Success:
The target for this Assessment is to have more than 60% of our students reach either c "much understanding" or "complete understanding"; that is, for more than 60% of our students to earn a score of '2' or '3'

instructors expressed concern that the Tussy book did not have word problems that adequately prepared students to answer these Assessment questions.

Standard Met?:
No

Semester and Year Assessment Conducted:
2013-14 (Spring 2014)

Faculty Assessment Leader:
Eduardo Barajas

Faculty Contributing to Assessment:
Eduardo Barajas, Tavakkoli, Aban Seyedin, Zachary Marks, Trudy Meyer, Formanes, Avid Khorram, Juan Martinez, Bob Lewis, Michael Bateman, Linda Ho, Robert Horvath, Greg Scott, A Hoang, Carl Broderick, Avid Khorram, Len Wapner, M George, H Hamza