Data Analysis for Advising Symposium

March 1, 2017

Gordon State College

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Interfacing with IR

David Wells

University System of Georgia

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Tips for Working With Your IR Professionals

- Don’t be shy!
- Sketch out what you want before you go to your IR office
- Don’t let the IR lexicon scare you off
- Be willing to negotiate for what you need
- Offer your expertise
- Requesting data is iterative
- You don’t need fancy products to use the data

Data and Math Pathways

Lori Hagood and Jonathan Hull

University System of Georgia

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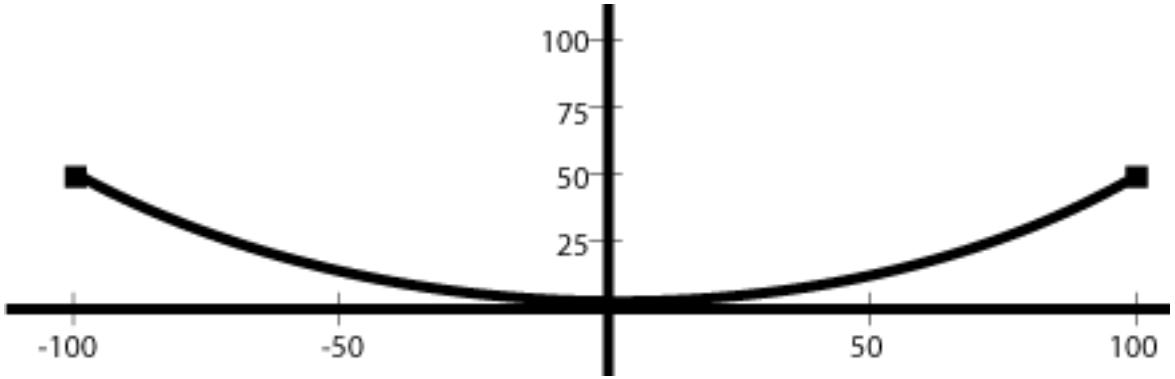
It starts with a question.

?

Not like this:

1. A parabolic dish with a diameter of 200 cm and a maximum depth of 50 cm is shown below. Find the focus of the dish.



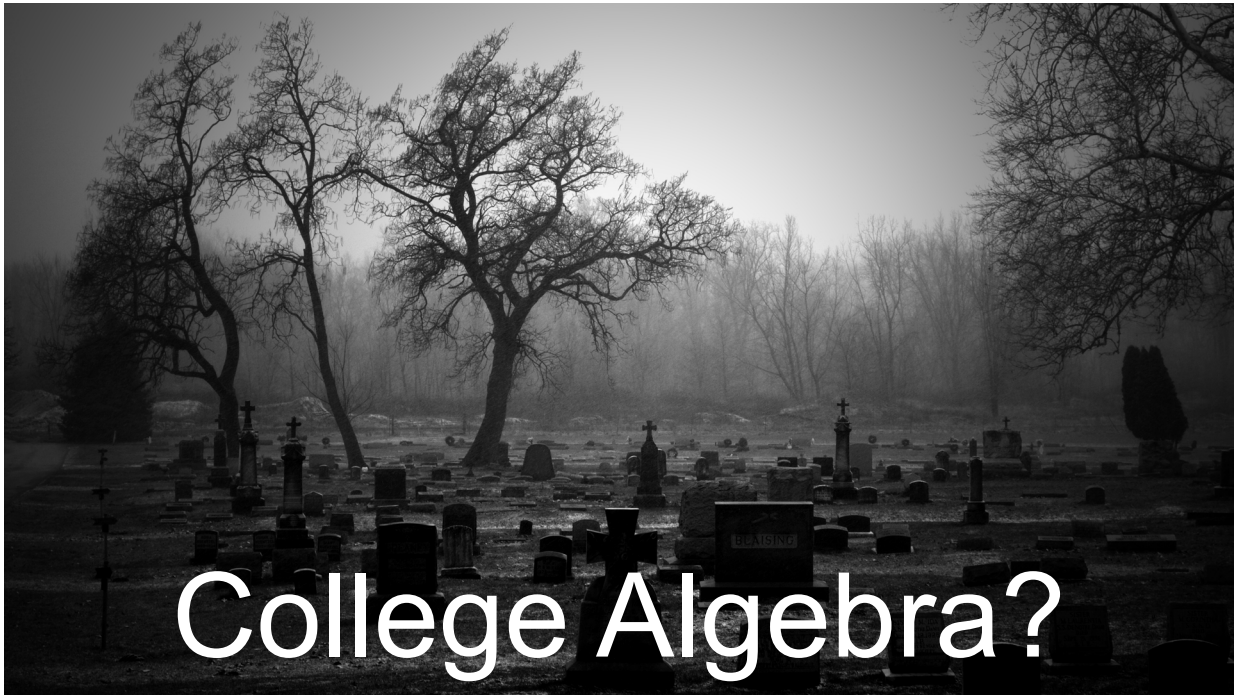
Or this:

2. Find the remainder if $4x^{200} + 5x^{95} - 4x^{21} + 2x - 6$ is divided by $x - 1$

Or even this:

3. Function f is a function with inverse f^{-1}. Function h is defined by $h(x) = A*f(x - h) + k$ where A, k and h are constants. Express the inverse function of h in terms of f^{-1}, A, k and h.

But more this:



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The Algebra Pathway

According to the Mathematical Association of America, the principle purpose of college algebra is to prepare students for pre-calculus and calculus.

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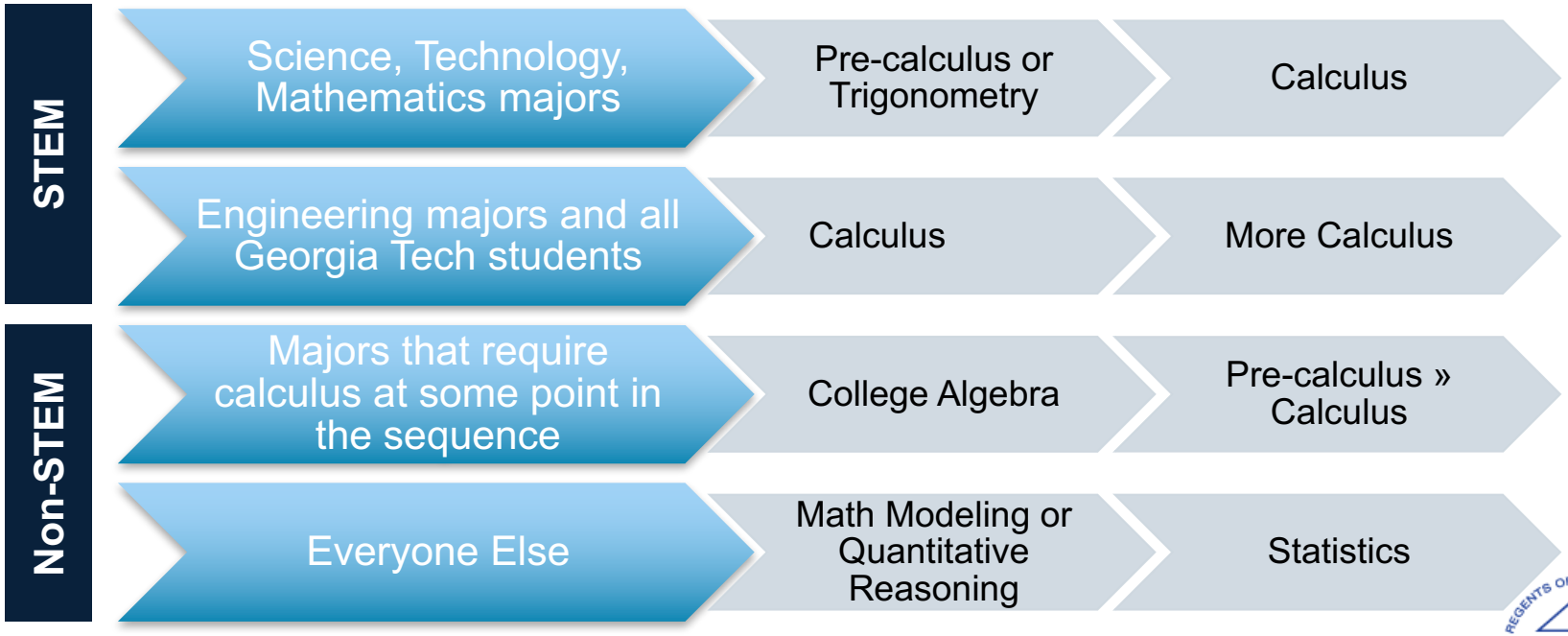
The Four Math Pathways

For many disciplines, quantitative reasoning or math modeling, perhaps with further study in statistics is the best fit.



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So our question becomes:

1. Do we have a problem with College Algebra?
    A. Yes
    B. No
    C. Maybe
    D. A & B, but not C
    E. A & C, but not B

Where can we go for answers?

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Math Pathways Data Request

Five years data on:

1. # of sections of MATH 1001, 1101, 1111 offered system-wide and at individual institutions

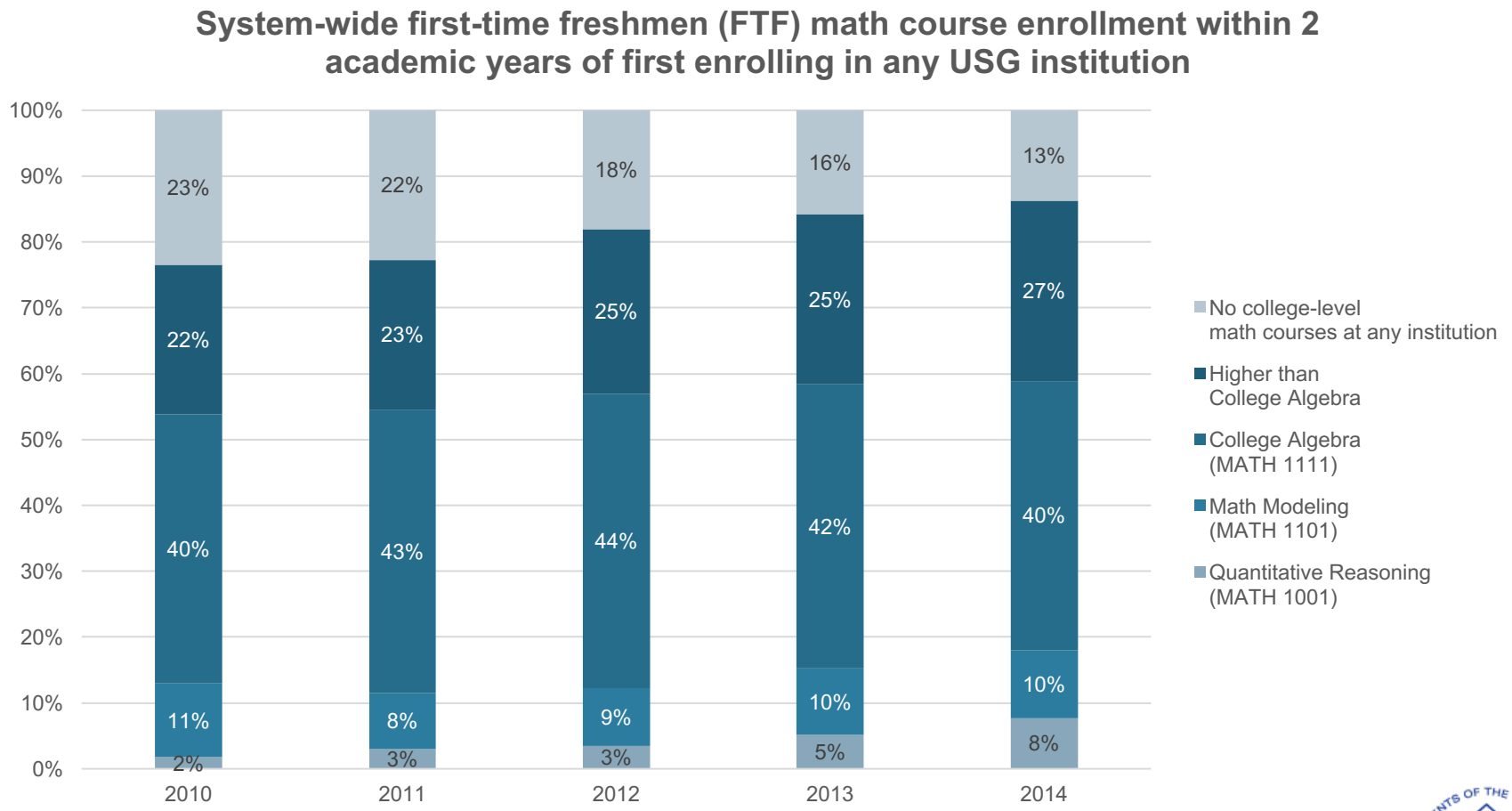
2. # and % students starting (first math course) at MATH 1112, 1113, or higher system-wide and at individual institutions. (Lack of standard numbering may hinder this effort.)

3. # and % of students in MATH 1001, 1101, and 1111 system-wide and at individual institutions sort by major, or at least by STEM vs. non-STEM

4. % of students passing MATH 1001, 1101, and 1111 with grades of “C” or better sort by major, or at least by STEM vs. non-STEM

5. % of students who took and passed MATH 1111 (College Algebra) who subsequently took (and passed) Calculus within the next five years.

Digging Deeper



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College Algebra = Default Math

College Algebra (MATH 1111) was the most common first math course at 24 USG institutions in 2014.

(ranging from 34% to 90% of students taking College Algebra as their first math course depending on the institution)

But did we have a problem?

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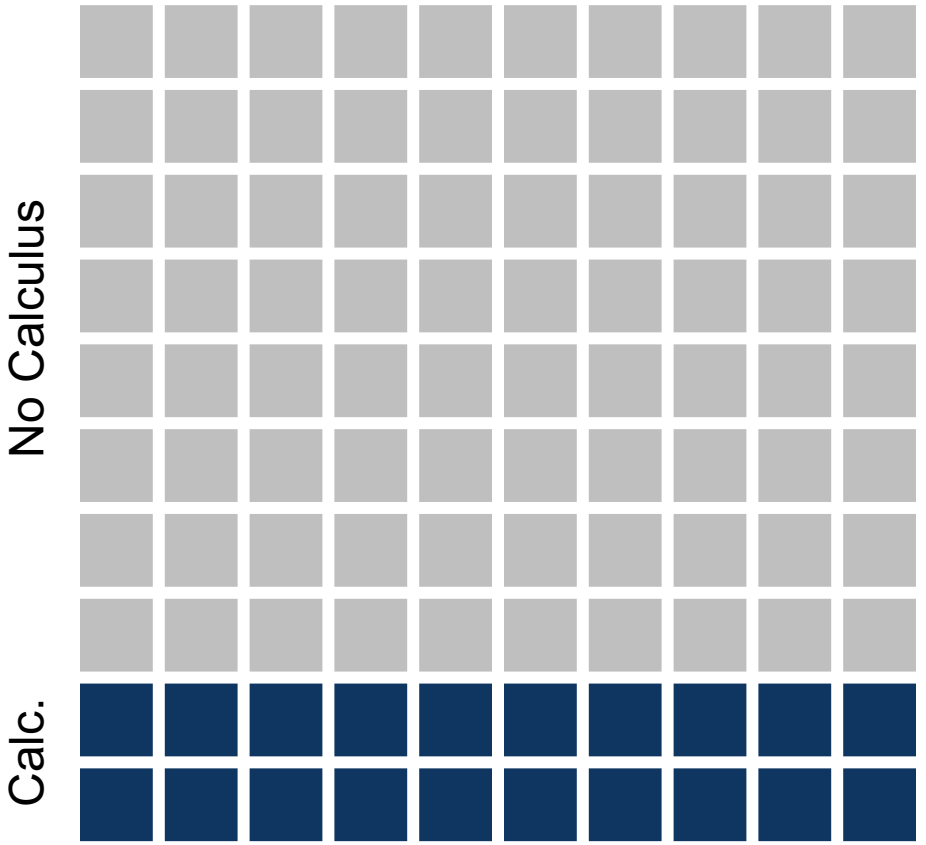
College Algebra Terminus

- Nationally, only about 10% of students who pass college algebra go on to take calculus.
- In the USG, that figure is actually closer to 20%.



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Back to math problems:

1. If 44,664 students take College Algebra, and 11,298 take a second, higher math later in their academic careers, what percentage of students didn't move beyond College Algebra?

A. 44,664 – 11,298 = 33,366
33,366 ÷ 44,664 = .747 or
74.7%

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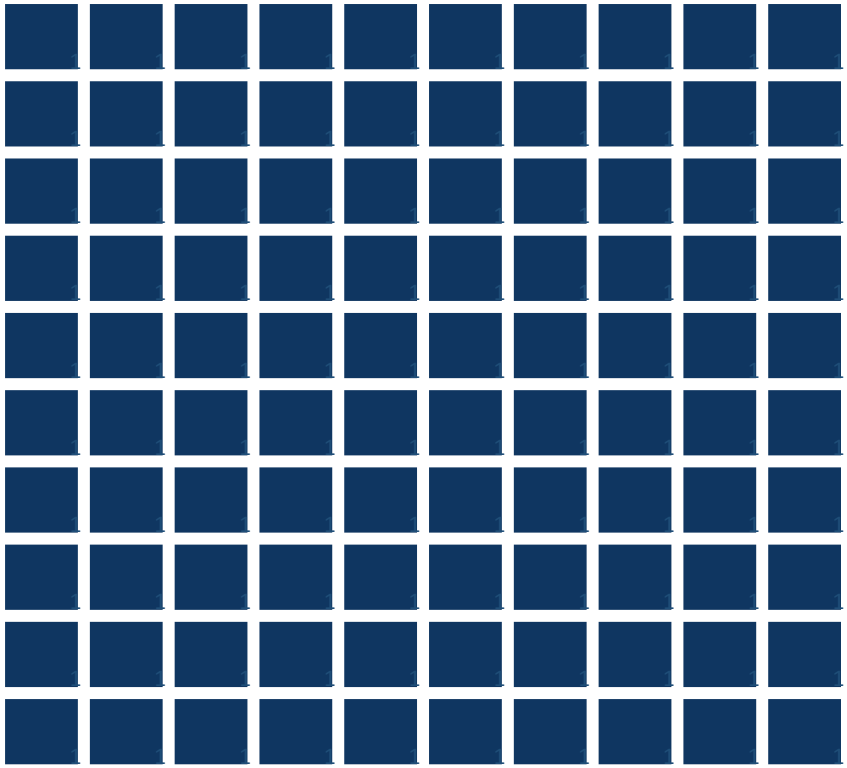
Visualizing the Issue

44,646

students enroll in College Algebra



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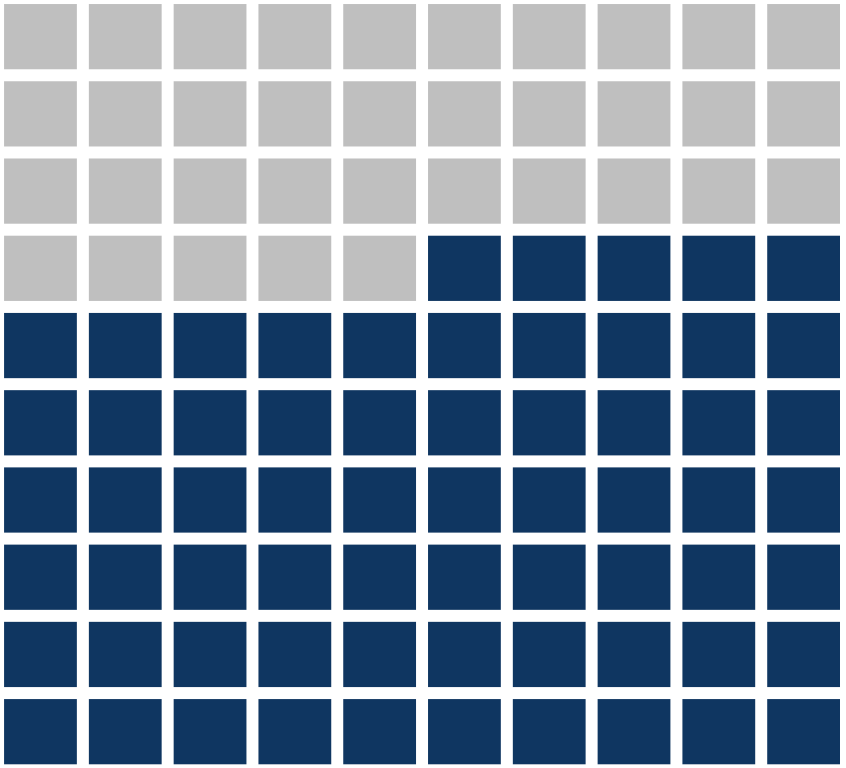
Visualizing the Issue

28,377

pass College Algebra

(64%)



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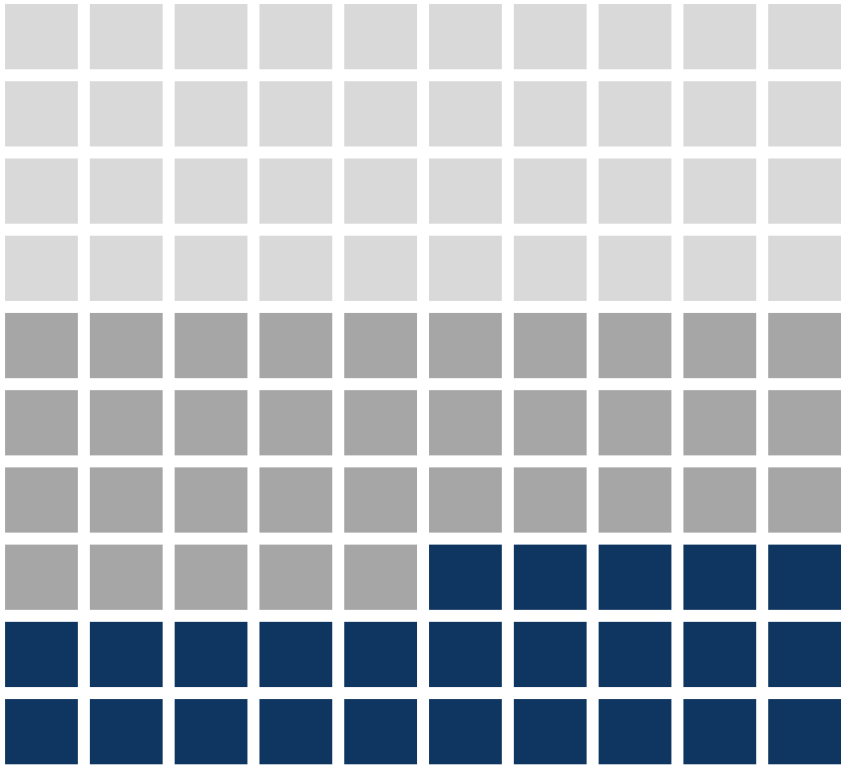
Visualizing the Issue

11,298

take Pre-Calculus or Trigonometry

(25% of students who took College Algebra; 40% of students who passed College Algebra)



*within 5 years at any USG institution.

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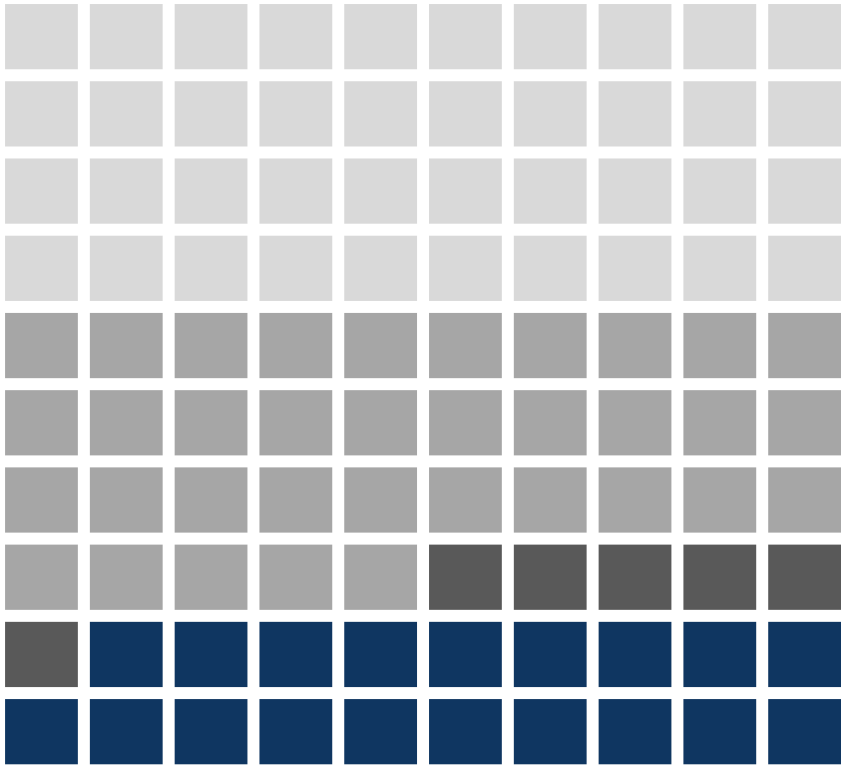
Visualizing the Issue

8,460

pass Pre-Calculus or Trigonometry

(19% of students who took College Algebra; 19% of students who passed College Algebra)



*within 5 years at any USG institution.

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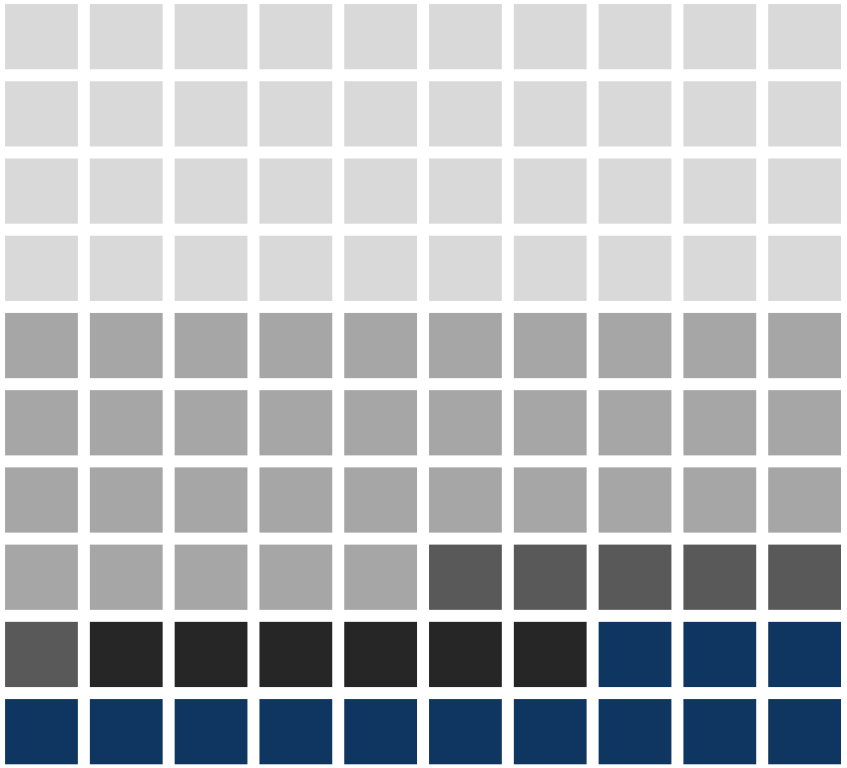
Visualizing the Issue

5,909

take a math beyond pre-calculus or trig

(13% of students who took College Algebra; 20% of students who passed College Algebra)



*within 5 years at any USG institution.

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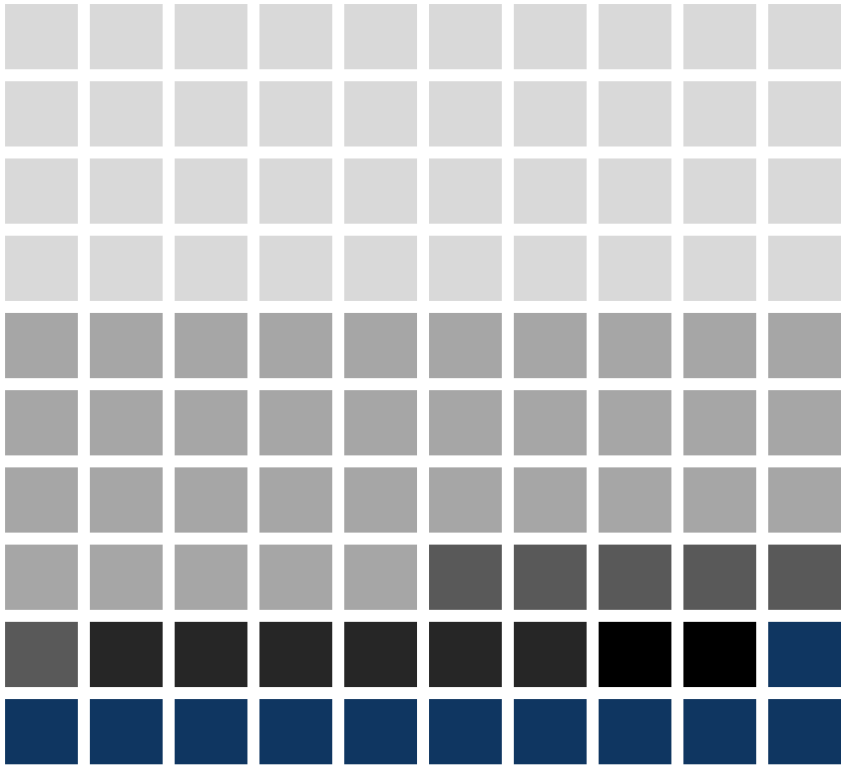
Visualizing the Issue

4,962

pass a math beyond pre-calculus or trig

(11% of students who took College Algebra; 18% of students who passed College Algebra)



*within 5 years at any USG institution.

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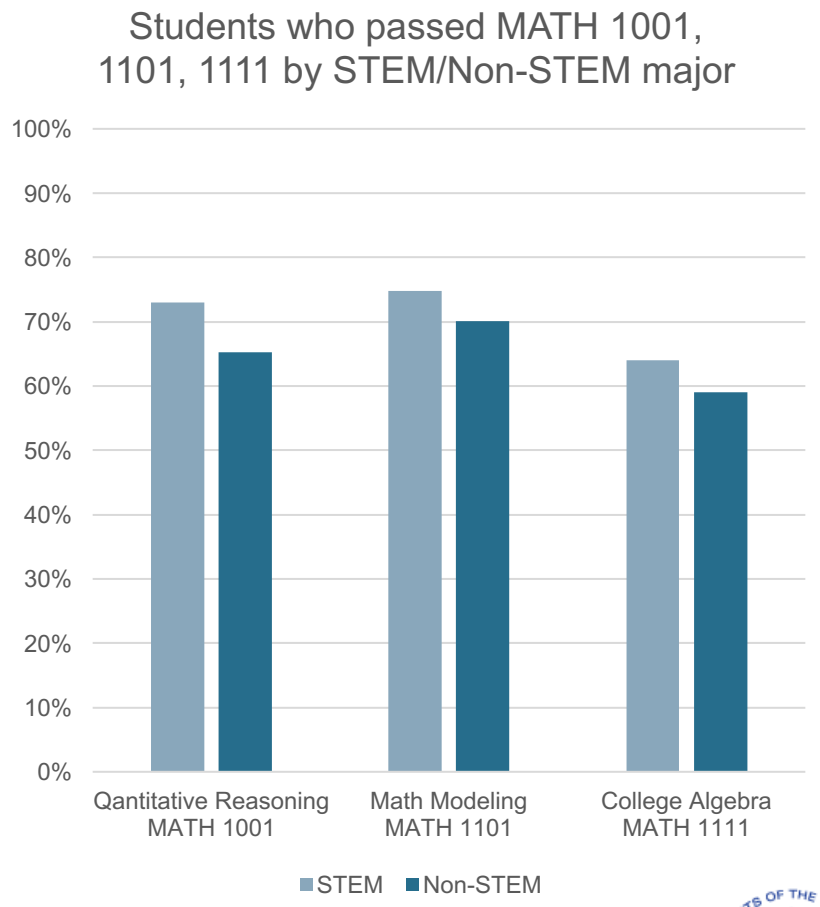
Math Placements

System wide over the past five years, **76%** of students in College Algebra were non-STEM majors.



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To sum up

- 40% of students are in College Algebra as their first math
- Pass rates for non-STEM majors in College Algebra are in the upper 50% range.
- One in five students who PASS College Algebra go on to take Calculus.

For 75% of USG students, College Algebra is the last math class they will take in college.

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This is a problem

Students may be advised into College Algebra as a “safe” option.

(e.g., it is guaranteed to “count” even if a student transfers or changes major)

Students may be selecting College Algebra on their own.

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So Who Needs College Algebra?

Math Pathways for non-STEM majors

(based on Regents Advisory Committee Recommendations

[1]USG institutions cannot require students to take a particular course from among MATH 1001, MATH 1101, and MATH 1111 as long as they are not STEM majors. No matter which of these math courses non-STEM students take, it must count toward satisfying Area A2 requirements and it must count toward graduation. However, students in non-STEM majors should be ADVISED to take the math course most appropriate for their intended majors. Where MATH 1001 or MATH 1101 is the default recommendation for a particular major students with strong math interests and abilities may opt to take MATH 1111, but MOST students should be advised to take MATH 1001 or MATH 1101.

Program/Major	Area A2 Mathematics Default Recommendation	
	MATH 1001 (Quantitative Reasoning) or MATH 1101 (Introduction to Mathematical Modeling)[1]	MATH 1111 (College Algebra)
Anthropology	✓	
Birth-to-Five Teacher Preparation	✓	
Business Administration	✓	
Communication	✓	
Criminal Justice	✓	
Digital Media	✓	
Early Childhood Education	✓	
Economics (non-BBA degree)		
English	✓	
Exercise and Health Science		✓
Exercise Science		✓
Family and Consumer Science/Home Economics Education		
Family/Child Development		
Film/Media Studies	✓	
Foreign Languages	✓	

Math Pathways for STEM majors

(based on Academic and Student Affairs Handbook 2.4.4 - Area A2 Quantitative Skills)

Program/Major	Area A2 Mathematics Default Recommendation	
	MATH 1113 (Precalculus) or higher	Calculus
Agricultural Science	✓[3]	
Architecture	✓	
Astronomy	✓	
Biology	✓	
Chemistry	✓	
Computer Science	✓	
Engineering		✓
Engineering Technology	✓	
Environmental Science	✓[3]	
Forestry	✓	
Geography (B.S.)	✓	
Geology	✓	
Mathematics	✓	
Mathematics Education	✓	
Pharmacy	✓	
Physical Therapy	✓	
Physics	✓	
Secondary Science Education	✓	

[3]Institutions **may** require precalculus in Area A2 for these majors. **Go Back**

completega.org/math-pathways

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Math: Gateway to Dreams

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Allow me to Answer your questions

1. The equation of the parabolic dish is of the form: $x^2 = 4 a y$
   Point (100 , 50) lies on the graph of the parabolic dish, hence
   $100^2 = 4 a * 50$
   solve to find: a = 50 which is also the distance from the vertex at (0 , 0) to the focus. Hence the focus is at (0 , 50 cm).
2. Using remainder theorem, remainder = *P(1)* = $4*1^{200} + 5*1^{95} - 4*1^{21} + 2*1 - 6 = 1$
3. $h^{-1}(x) = f^{-1}((x - k) / A) + h$