



TPSEMath

Transforming Post-Secondary Education in Mathematics

JUST



EQUATIONS



The University of Texas at Austin
Charles A. Dana Center

THE PROBLEMATIC MATH OF COLLEGE ADMISSIONS

October 6, 2022

PANELISTS

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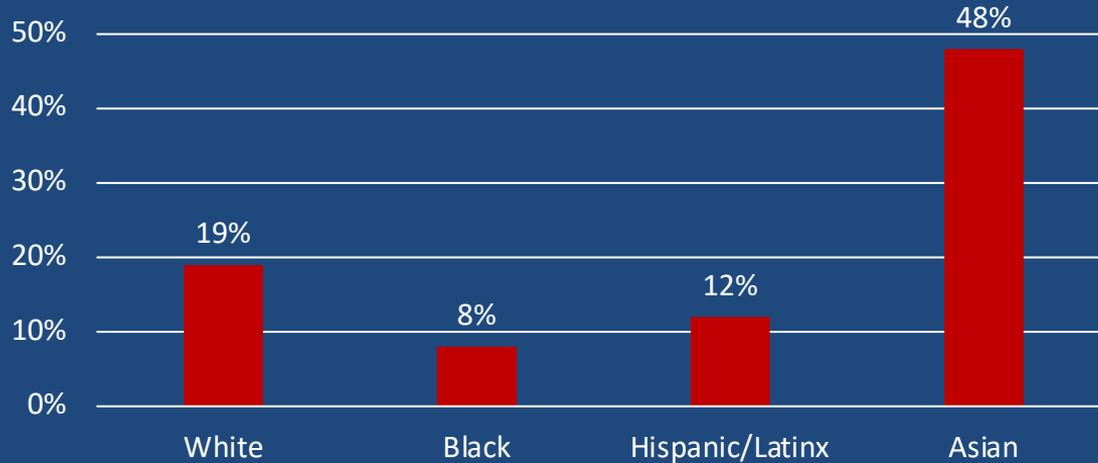
David Hawkins, National Association for College Admission
Counseling (NACAC)

Dan Teague
(North Carolina School of Science and Math)

“The goals of most high school students taking calculus are focused on college admissions rather than mastery of the content.”

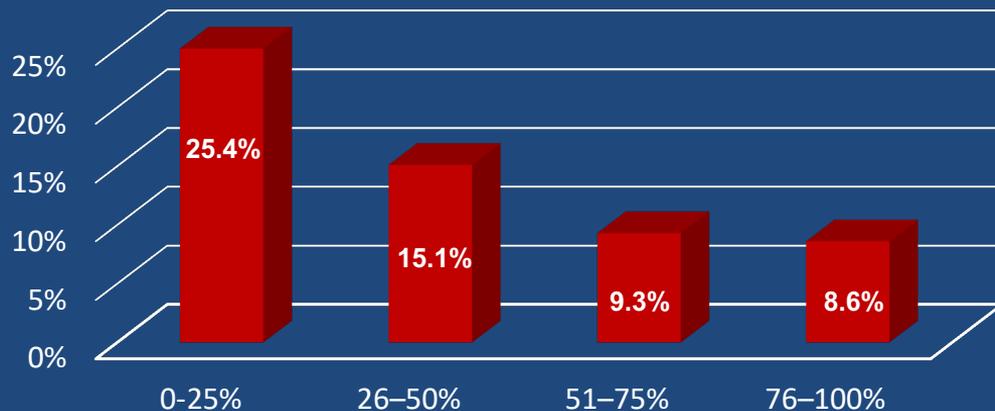
"Most students don't want to take AP Calculus; they just want to have taken AP Calculus.”

PERCENTAGE OF STUDENTS WHO TAKE CALCULUS IN HIGH SCHOOL BASED ON RACE/ETHNICITY



Only 38% of high schools with at least 75% Black or Hispanic/Latinx students offer calculus

PERCENTAGE TAKING CALCULUS BY PERCENT OF STUDENTS ON FREE OR REDUCED LUNCH



Among the high school class of 2013, 37% of the students in the highest quintile of socio-economic status had completed a calculus course.

PERCENTAGE OF STUDENTS WITH CALCULUS ON HIGH SCHOOL TRANSCRIPT WHO HAD TAKEN AN AP CALCULUS EXAM

Year	AB Exams	BC Exams
2009	37.6%	11.9%
2013	42.1%	15.6%
2019	51.9%	24.1%

This represents a lot of double counting.

In many high schools, passing AB Calculus is a *prerequisite* for taking BC Calculus.

REFERENCES

College Board (2019). *AP Program Summary Report 2019*.
<https://reports.collegeboard.org/ap-program-results>

Dalton, B., Ingels, S.J., and Fritch, L. (2018). *High School Longitudinal Study of 2009 (HSLs:09) 2013 Update and High School Transcript Study: A First Look at Fall 2009 Ninth-Graders in 2013 (NCES 2015-037rev)*. U.S. Department of Education. Washington, DC: National Center for Education Statistics. <https://nces.ed.gov/pubs2015/2015037rev2.pdf>

National Center for Education Statistics. (2022). *Percentage of public and private high school graduates who completed selected mathematics courses in high school, by selected student and school characteristics*. Table 225.40 in *Digest of Education Statistics*.
https://nces.ed.gov/programs/digest/d21/tables/dt21_225.40.asp

A pdf file of this PowerPoint is available at
<https://DavidBressoud.org/talks>

JUST EQUATIONS

Reconceptualizing the role of math education in ensuring educational equity.

Aligning K12 Math with College Admissions

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*“While there is an important role for calculus in secondary school, the ultimate **goal of the K-12 mathematics curriculum should not be to get into and through a course of calculus** by 12th grade, but to have established the mathematical foundation that will enable students to pursue whatever course of study interests them when they get to college.”*

- Mathematical Association of America & National Council of Teachers of Mathematics, 2012

ADMISSIONS POLICY & HIGH SCHOOL MATH

- Emergence of new, modern postsecondary pathways such as statistics, and quantitative reasoning, in addition to the calculus pathway.
- New high school math options such as statistics and data science with potential to improve equitable college access and success.
- Concern that college admissions policies and practices—especially those at elite institutions—create barriers to progress.
- Preferences (real or perceived) for sequences leading to calculus may stifle innovation, especially among high schools that emphasize college prep.

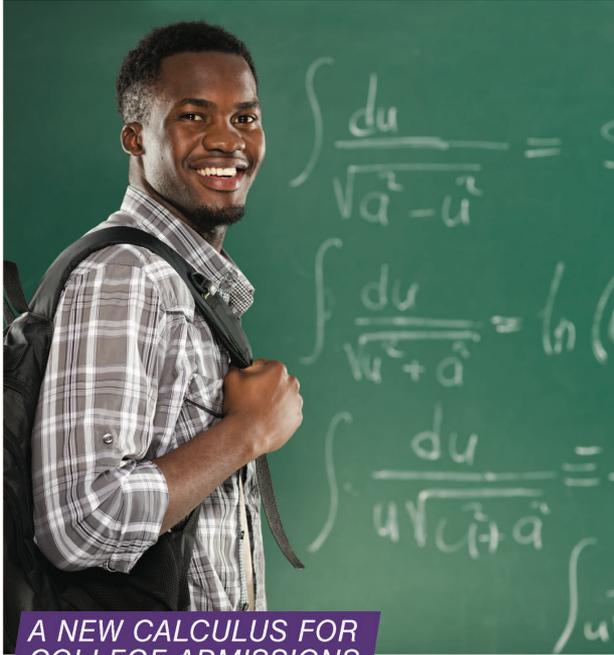
Research Questions & Methodology



RESEARCH QUESTIONS

- Are college admissions policies and practices—especially those at elite institutions—creating barriers to implementing relevant and rigorous high school math courses and exacerbating inequities in math coursetaking?
- Do preferences (real or perceived) for math pathways culminating in Calculus stifle innovation and opportunity at the high school level—especially at high schools that emphasize college prep?



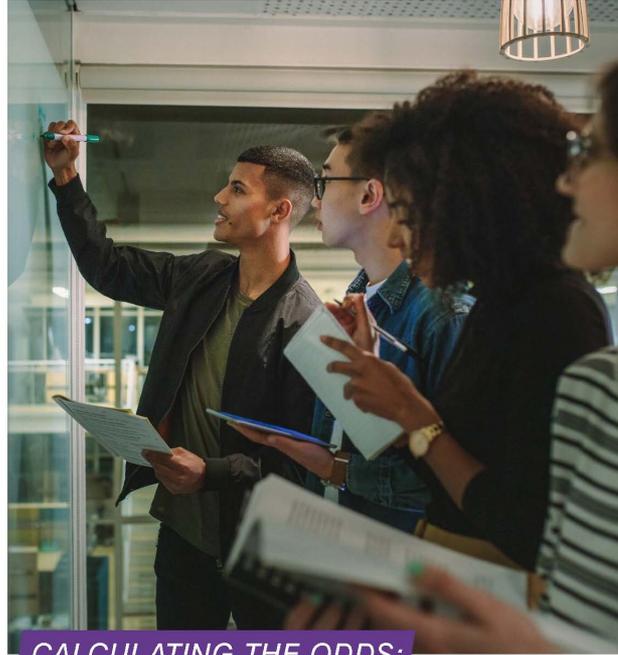


A NEW CALCULUS FOR COLLEGE ADMISSIONS

HOW POLICY, PRACTICE, AND PERCEPTIONS OF HIGH SCHOOL MATH EDUCATION LIMIT EQUITABLE ACCESS TO COLLEGE

By Veronica Anderson and Pamela Burdman

January 2022



CALCULATING THE ODDS:

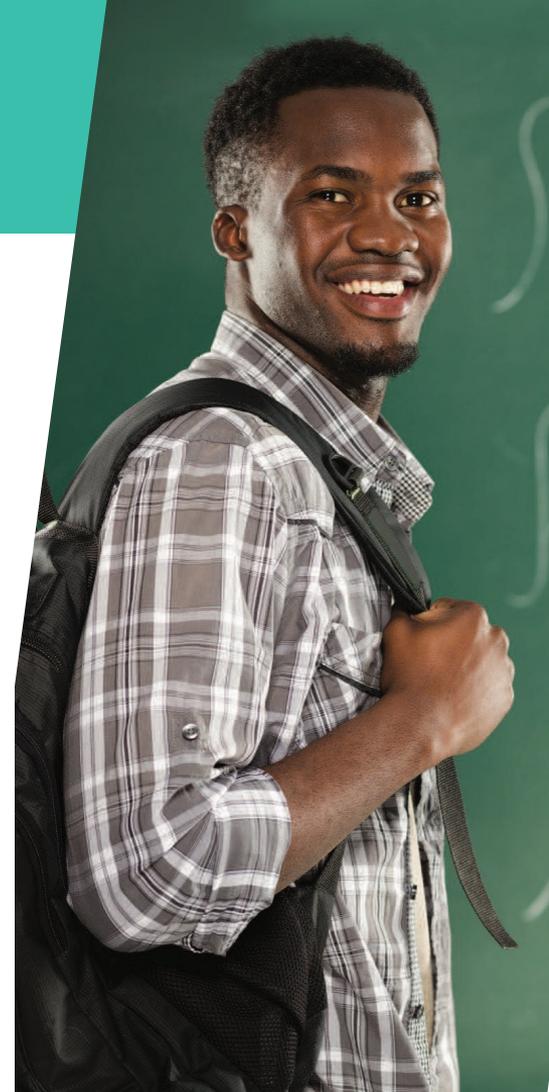
COUNSELOR VIEWS ON MATH COURSETAKING AND COLLEGE ADMISSIONS

By Pamela Burdman and Veronica Anderson

September 2022

A NEW CALCULUS FOR COLLEGE ADMISSIONS (2021)

- Surveyed 1,250 college admissions professionals (NACAC members)
- 137 responded—58 public and 79 private non-profits
- Interviewed 15 college admissions officers – 5 private and 10 public



CALCULATING THE ODDS (2022)

- Surveyed 1,967 HS counselors, 323 responded, mostly private schools
- 605 independent education consultants, 70 responded
- Interviewed 14 college counselors—7 public, 4 private, 3 independent advisors



Findings

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“Calculus is the gold standard that people in this business use as a shortcut.”

“We recommend that all applicants take calculus, if it is available to them.”

“We expect to see math through calculus. Students without calculus are much less likely to succeed in our curriculum.”

-admissions officers

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“Slowing down the math progression and really learning it is way better than accelerating, but I think there is a disconnect. When I worked in admissions, we definitely dinged kids who didn’t have calculus on their transcript.”

“It is deeply problematic that college admission offices—many of which are entirely unaware of how actual math content, sequencing, programs work—use calculus as a benchmark for college admission. It’s one of the most frustrating things about the process.”

-high school counselors

CALCULUS SELDOM REQUIRED FOR ADMISSION...

Math for General Admission

Three years	50 percent
Four years	38 percent
Two years	12 percent

Math for Technical Majors

Calculus for engineering, physical science, math, business	21 percent
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... BUT IT SEEMS TO WEIGH HEAVILY IN ADMISSIONS

Does calculus give applicants an edge in the admissions process?

Yes or It Depends

53 percent

No

47 percent

Students who take high school calculus are more likely to succeed in college.

Agree

79 percent

COUNSELORS BELIEVE COLLEGES EXPECT CALCULUS SO THEY RECOMMEND IT BY DEFAULT

Applicants who take Calculus
have an edge in admissions.

Agree

93 percent

Students who don't take Calculus
in high school have narrowed
options in college.

Agree

73 percent

Students who take high school
calculus are more likely to
succeed in college.

Agree

64 percent

HIGH SCHOOLS SAY STATISTICS IS VALUABLE, BUT NOT FAVORED IN ADMISSIONS

Statistics is valuable preparation for a wide range of college majors.

Agree

96 percent

Calculus outweighs other advanced math, such as statistics.

Agree

61 percent

High school statistics is not as rigorous as high school calculus.

Agree

67 percent

ADMISSIONS OFFICERS DISCOUNT STATISTICS

Which advanced high school math courses carry the most weight for admissions?

AP Calculus	75 percent
Calculus	73 percent
Precalculus	50 percent
AP Statistics	38 percent

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“It’s like an arms race for taking the higher-level courses, and the more everybody takes, the more everybody else takes.”

-high school counselor

Sample University Policies & Practices



UNIVERSITY OF CALIFORNIA

- Three years of college-prep math required (four years recommended), including or integrating topics covered in:
 - Elementary algebra
 - Advanced algebra
 - Two- and three-dimensional geometry
- Advanced math courses (for third or fourth year), e.g.
 - Calculus
 - Data Science
 - Linear Algebra
 - Precalculus
 - Probability
 - Statistics

STANFORD UNIVERSITY

ADMISSIONS REQUIREMENT:

*Four years of any rigorous mathematics incorporating a solid grounding in fundamental skills (algebra, geometry, trigonometry). We also welcome preparation including **calculus and statistics**.*

HARVARD COLLEGE

*Applicants to Harvard should excel in a challenging high school math sequence corresponding to their educational interests and aspirations. Rigorous and relevant **data science, computer science, statistics, mathematical modeling, calculus,** and other advanced math classes are given equal consideration in the application process. Specifically, **calculus is neither a requirement nor a preference** for admission to Harvard.*

DISCUSSION



Policy Recommendations



FOR COLLEGES AND UNIVERSITIES

- Adopt clear admissions policies and specific guidelines about math expectations for various schools and majors.
- Engage intersegmental, interdisciplinary, and cross-functional audiences to inform new policies, and then implement those new policies consistently.
- Develop shared resources on alignment of math sequences with various majors and careers.

FOR K-12 SCHOOLS, DISTRICTS, STATE EDUCATION DEPTS

- Expand math offerings to include rigorous and relevant options aligned with college majors and careers.
- Articulate college counseling with academic counseling as early as the transition to middle school.
- Attend to students' mental health and well-being.

“

“In moving away from test scores, Calculus will be the next frontier for battles of access and equity in higher education.”

- Andy Borst, University of Illinois

Q&A





THANK YOU

JustEquations.org