

Dear Ms. Hull-Barnes, Mr. Nguyen, and Board of Education Commissioners:

We write to you as concerned faculty at Harvard, Stanford, UC Berkeley, and UCLA, in our personal capacity based on our extensive experience in STEM education, as well as in efforts to broaden the reach of STEM to under-served populations, including programs such as AddisCoder (teaching algorithms and coding to high-school students in Ethiopia) and the Prison Math Project.

As such, we are concerned by policies that, although well-intentioned, make SFUSD students less prepared for success in post-secondary STEM education, disproportionately harming under-resourced students, who cannot supplement their public education with private options. We are particularly alarmed at the assertions that such policies are justified by our universities' admission guidelines, and the implicit suggestion that calculus is less important for university success today than it was in previous times (see slide 15 in an upcoming [June 13th slide deck](#), which was posted on the SFUSD website). While we cannot speak on behalf of our institutions (nor can the SFUSD BOE), none of us has seen any evidence to support such statements. For example, 93% of [incoming Harvard students](#) have taken calculus or above in high school.

The idea that conceptual understanding is incompatible with acceleration is not supported by evidence. (See for example Section 4 of [this document](#).) Moreover, taking Algebra I in 8th grade is not “over acceleration”. This has been the focus of Bob Moses’ “[Algebra Project](#)”, and is the path taken by many of our students. Time and again we’ve heard from minority and first-generation engineers and scientists that they wouldn’t be where they are if they didn’t have the opportunity to take that course in 8th grade. The Common Core 8th grade curriculum is not comparable content-wise to an Algebra I course, contrary to what is suggested in another of your slides.

Interest in STEM and quantitative degrees has risen dramatically in our universities and across the country. All such degrees we are aware of (including data science and computer science) include calculus as part of their requirements. This makes rigorous mathematical preparation, and in particular calculus, more important for students’ success than ever before. While calculus is not a condition for admission, students who do not take calculus in high school (and especially students who don’t take pre-calculus) are at a disadvantage relative to their classmates for opportunities in coursework, internships, and research during college. A public school system that does not provide a path for calculus does a great disservice to its students.

Quality always trumps quantity, and it is better that a student finishes with a solid grasp of precalculus than rush to calculus with shaky foundations. In particular, “compression courses” as employed as a policy for all students in SFUSD are antithetical to responsible preparation. Squeezing both Algebra II and precalculus into a single course can work for some exceptionally motivated students, but cannot be the recommended path for the majority of students who desire to take calculus in high school. It not only shortchanges students in their learning of precalculus material, but also in their learning of Algebra II content, which is essential for

success in introductory courses in biology, chemistry, economics, and many other fields. The impact on college success and diversity efforts was addressed in a recent [LA Times Op-Ed](#) by the deans of the UC Berkeley Schools of Information (home of the Berkeley data science major) and of Engineering.

STEM degrees (including data science) are one of the best paths for social mobility, and we urge the SFUSD Board of Education to consult with STEM faculty in higher education when making math curricular changes to ensure readiness for college-level work. We also urge that the reputation of specific universities not be invoked to justify math course policies for all students when disinterested experts from the STEM departments of such universities have played no role in the development of these policies.

Regards,

Boaz Barak

Gordon McKay Professor of Computer Science and co-Director of Undergraduate Studies in Computer Science (Harvard University)

Brian Conrad

Professor of Mathematics and Director of Undergraduate Studies in Mathematics (Stanford University)

Jelani Nelson

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Symantec Chair Professor of Computer Science and Director of Center for Encrypted Functionalities (UCLA) and advisor to the [Prison Math Project](#).