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# **AP<sup>®</sup> Precalculus and Student Pathways: Evidence on Early Postsecondary Outcomes and High School Calculus Performance**

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## Abstract

This report examines early outcomes associated with AP<sup>®</sup> Precalculus, a course introduced to expand access to rigorous mathematics pathways and support readiness for advanced math and STEM participation in college. Using national data, we present two complementary analyses of student pathways. First, we examine postsecondary outcomes among students who took AP Precalculus in 12th grade as a culminating mathematics experience, including college enrollment, entry into STEM majors, and persistence in STEM majors into the second year. Second, we examine high school progression by assessing AP Calculus AB and BC Exam performance among students who took AP Precalculus in grades 9–11 and subsequently enrolled in AP Calculus. Results, based on models adjusting for prior achievement and student characteristics, show that AP Precalculus participation is associated with higher predicted probabilities of college enrollment and STEM participation, as well as modest but consistent increases in the likelihood of earning scores of 3 or higher on AP Calculus Exams.

## Introduction

In the 2023–24 school year, College Board introduced AP<sup>®</sup> Precalculus to broaden access to rigorous mathematics pathways and support students' readiness for college-level mathematics and STEM. The initial research brief, *AP<sup>®</sup> Precalculus: Who Participated and What We Learned in Launch Year*, documented the course's historic rollout, with over 184,000 exam takers in its first year, and provided early insights into where the course was offered, who enrolled, and how participation compared with other AP math subjects (Ewing et al., 2025). The brief also highlighted the diversity of students reached, with AP Precalculus attracting higher percentages of Black, Hispanic, and first-generation students than other AP math courses, suggesting its potential to broaden participation in advanced STEM coursework among students without prior AP experience.

Participation in AP Precalculus grew substantially in its second operational year, with exam participation increasing 37% between 2023–24 and 2024–25, while representation across student groups remained largely consistent. Most students continued to take AP Precalculus in 11th grade, accounting for more than half of exam takers in both years. Participation among 12th-grade students increased slightly in Year 2 (+0.8 percentage points), indicating modest growth in participation among seniors.

While early findings pointed to encouraging patterns in access and representation, questions remain about students' longer-term educational trajectories. Because students take AP Precalculus at different points in high school, this follow-up report examines outcomes using two distinct groups. For students who took AP Precalculus in 12th grade, representing a culminating high school mathematics experience, we focus on postsecondary enrollment and STEM pathways. For students who took AP Precalculus in grades 9–11, we examine subsequent participation and performance in AP Calculus.

Accordingly, this report addresses two key questions:

1. Among 12th-grade students for whom AP Precalculus represented a culminating high school mathematics experience, were they more likely to enroll in college, declare a STEM major at entry, and persist in that major into their second year, compared with similar peers?
2. For students who took AP Precalculus in grades 9–11, earned a score of 3 or higher, and subsequently enrolled in AP Calculus, how did they perform?

By extending the analysis to include both postsecondary outcomes and high school mathematics progression, this report builds on the launch-year findings and provides a more comprehensive understanding of how AP Precalculus is associated with students' pathways into STEM. These findings aim to inform educators,

policymakers, and researchers as they consider the role of AP Precalculus in expanding access to STEM opportunities and supporting longer-term academic outcomes.

## Data and Methodology

The analytic samples and methods varied by research question. To examine the relationship between taking AP Precalculus in 12th grade and postsecondary outcomes, we used 2024 cohort data from the National Student Clearinghouse (NSC), which tracks postsecondary enrollment and degree attainment at two- and four-year institutions in the United States. Logistic regression models were used to estimate (a) the likelihood of enrolling in any two-year or four-year college in the fall immediately following high school graduation, (b) the likelihood of declaring a STEM major at college entry, and (c) the likelihood of persisting in a STEM major into the second year, among students who initially declared one. Models controlled for prior academic achievement and demographic characteristics, and analyses were restricted to students without missing values on all variables. The final analytic samples included 1,212,496 students for the college enrollment analysis (including all high school graduates), 796,025 students for the STEM major entry analysis, and 181,026 students for the persistence analysis.

To examine the relationship between taking AP Precalculus in 2024 and subsequent performance in AP Calculus, we identified students who took the AP Calculus AB or Calculus BC Exams in 2025 and linked their records to AP Precalculus participation in the prior academic year. Logistic regression models were used to estimate the likelihood of earning a score of 3 or higher on the AP Calculus AB and BC Exams, controlling for prior academic achievement and demographic characteristics. Analyses were restricted to students without missing values on all variables included in the models. The final analytic samples included 121,727 AP Calculus AB students and 70,358 AP Calculus BC students.

## Results

### AP Precalculus in 12th Grade Is Associated with Higher Rates of College Enrollment, STEM Major Selection and Persistence

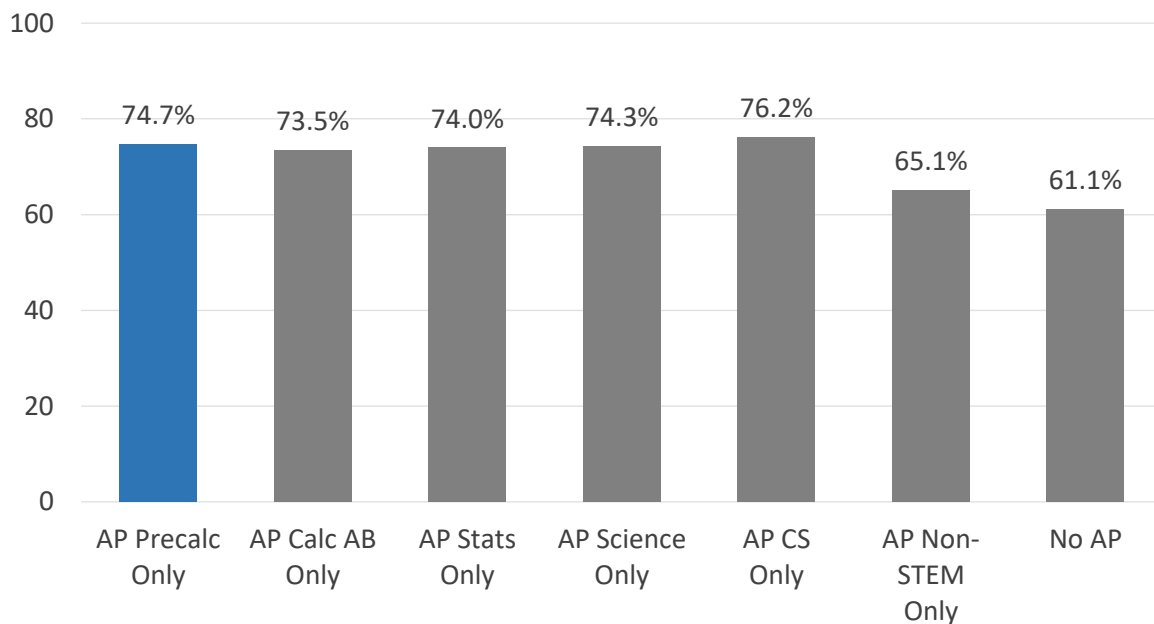
Our first analysis examines whether taking AP Precalculus in 12th grade as a culminating high school mathematics experience is associated with students' postsecondary trajectories. Specifically, we examine college enrollment, initial entry into STEM majors at the start of college, and persistence in those majors through the second year across four groups of students. These groups include: (1) students who took AP Precalculus in 12th grade as their only AP STEM Exam, (2) those who took another AP STEM Exam(s) for the first time in 12th grade including AP Calculus AB or AP Statistics or any AP Science or any AP Computer Science Exam, (3) those who took AP but no AP STEM Exam before high school graduation, and (4) those who did not take any AP Exams during high school.<sup>1</sup> **Appendix Table 1** provides more detailed sample size information by outcome and group based on the analytical sample. Predicted probabilities adjust for prior academic achievement and student characteristics, including PSAT scores, high school GPA, and demographic factors.<sup>2</sup>

**Figure 1** shows the predicted probability of college enrollment among students who took AP Precalculus in 12th grade as their only AP STEM Exam is 74.7%. This is the second-highest predicted enrollment rate behind only AP Computer Science (76.2%) and enrollment rates for other AP STEM groups are very similar: AP Calculus AB (73.5%), AP Statistics (74.0%), and any AP Science (74.3%). Students who took AP Exams, but no AP STEM Exams had lower predicted probabilities of enrollment (65.1%), while students who did not take any AP Exams had the lowest predicted probability (61.1%). These results indicate that students whose first exposure to AP STEM occurred in 12th grade, whether through AP Precalculus or another AP STEM, have similarly high predicted probabilities of enrolling in college. In contrast, students without AP STEM participation, particularly those with no AP experience, have much lower predicted probabilities of enrollment.

<sup>1</sup> AP Calculus BC results are not shown disaggregated because the sample of students who took AP Calculus BC as their only STEM AP Exam is very small.

<sup>2</sup> Postsecondary outcome models control for prior academic achievement, including PSAT total score and high school GPA, as well as student characteristics (gender, race/ethnicity, and first-generation college-going status). AP participation variables include indicators for AP Precalculus, another AP STEM Exam, and AP participation without a STEM Exam. Analyses are restricted to students with nonmissing values on all variables included in the models.

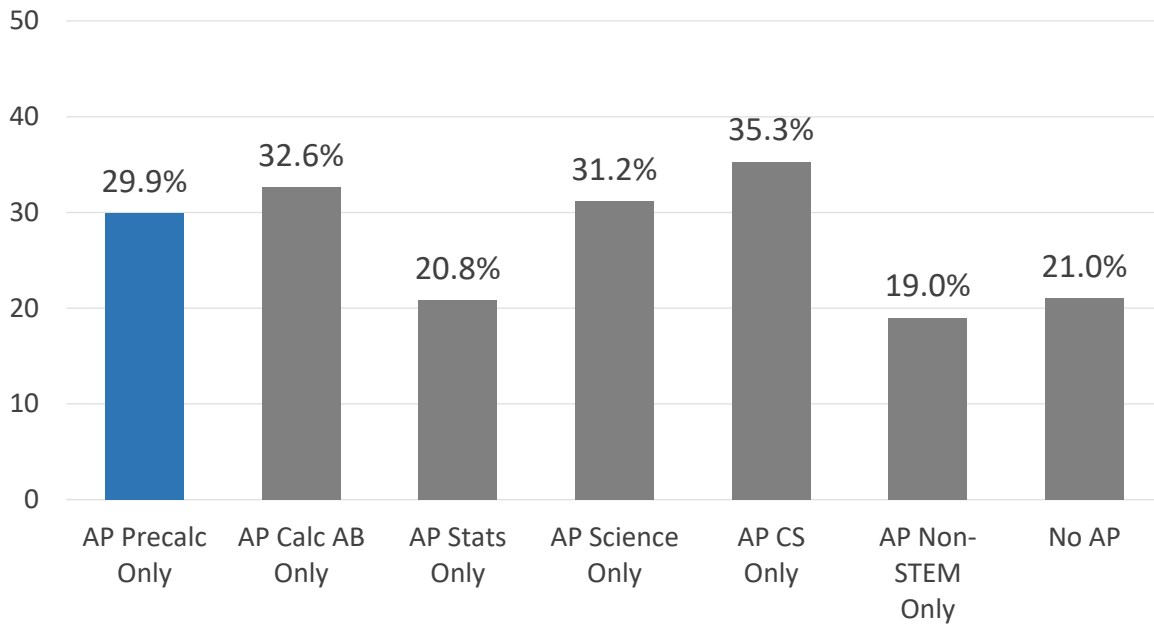
**Figure 1. Predicted Probability of Enrolling in College by First AP STEM Exam Participation in 12th Grade**



*Note:* Predicted probabilities are calculated for a reference student with average academic characteristics and demographic values set to White, male, and non-first generation. The first two bars are based on predictions for students whose first AP STEM exam occurred in 12th grade. This restriction applies only to AP STEM participation; students in all AP groups may have taken non-AP STEM exams in earlier grades with the number of non-STEM AP Exams set to the mean for the sample.

**Figure 2** shows the predicted probability of declaring a STEM major at the start of the first year of college across the same groups of students. When we compare AP Precalculus students to students who take a different AP STEM Exam for the first time in 12th grade, AP Precalculus students declared STEM majors at rates generally comparable to those who took AP Calculus AB (29.9% vs. 32.6%) or AP Science (31.2%). While AP Computer Science students showed somewhat higher rates (35.3%), AP Precalculus students substantially outpaced those who took only AP Statistics (20.8%) or AP Non-STEM exams (19.0%). Across students with comparable academic preparation and background characteristics, the predicted probability of declaring a STEM major is approximately nine percentage points higher for AP Precalculus students than for non-AP students.

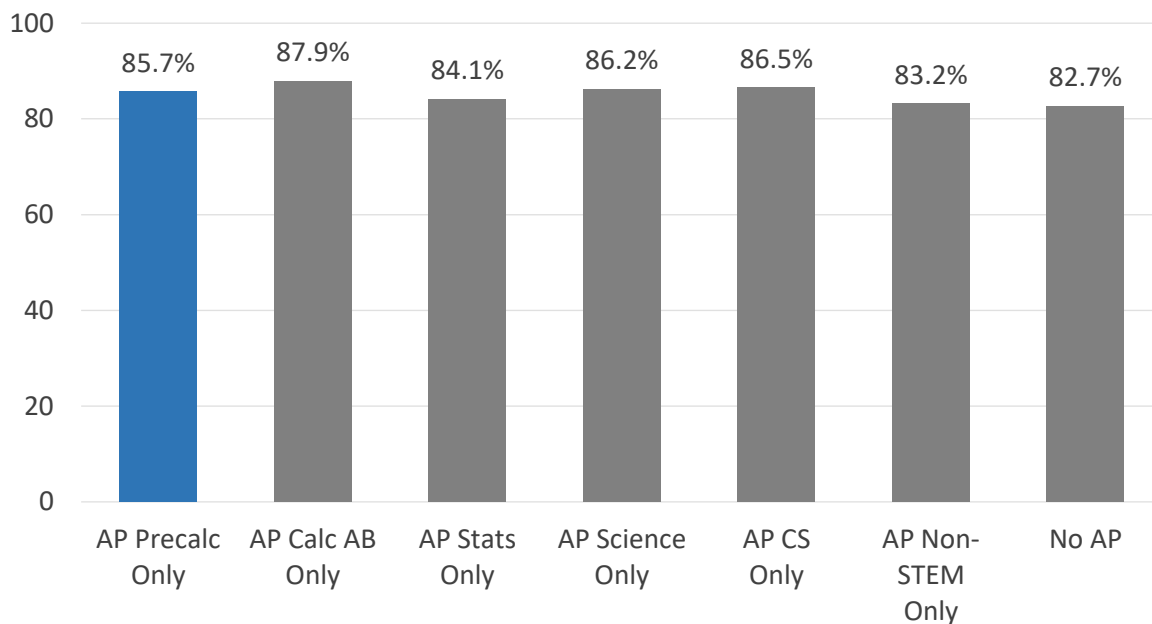
**Figure 2: Predicted Probability of Declaring a STEM Major by First AP STEM Exam Participation in 12th Grade**



*Note:* Predicted probabilities are calculated for a reference student with average academic characteristics and demographic values set to White, male, and non-first generation. The first two bars are based on predictions for students whose first AP STEM exam occurred in 12th grade. This restriction applies only to AP STEM participation; students in all AP groups may have taken non-AP STEM exams in earlier grades with the number of non-STEM AP Exams set to the mean for the sample.

While the previous analysis examined the likelihood of declaring a STEM major, **Figure 3** focuses on persistence in a STEM major into the second year of college among students who initially declared one. As shown in the figure, AP Precalculus students persisted in STEM at rates relatively comparable to those who took AP Calculus AB (85.7% vs. 87.9%), AP Science (86.2%), and AP Computer Science (86.5%). AP Precalculus students outpaced AP Statistics (84.1%), Non-STEM AP Exams (83.2%), and students with no AP experience (82.7%). Taken together, these findings indicate that students who begin their AP STEM experience with AP Precalculus are generally as likely to persist in STEM than peers who take other AP STEM Exams, and more so than students who take AP Statistics as their only AP STEM in 12th grade, reinforcing its role as a meaningful pathway into sustained STEM participation.

**Figure 3. Predicted Probability of Persisting in a STEM Major into the Second Year of College by First AP STEM Exam Participation in 12<sup>th</sup> Grade**



*Note:* Predicted probabilities are calculated for a reference student with average academic characteristics and demographic values set to White, male, and non-first generation. The first two bars are based on predictions for students whose first AP STEM exam occurred in 12th grade. This restriction applies only to AP STEM participation; students in all AP groups may have taken non-AP STEM exams in earlier grades with the number of non-STEM AP Exams set to the mean for the sample.

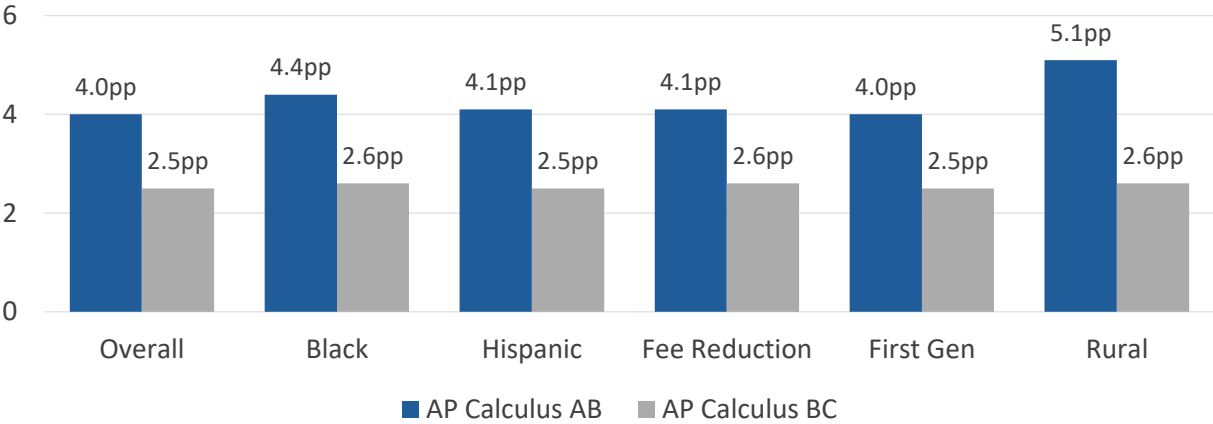
### **AP Precalculus Participation is Associated with Greater Success in AP Calculus**

Previous research found that 78% of students who took AP Precalculus in grades 9–11 enrolled in at least one AP STEM course the following year, and 60% enrolled in AP Calculus AB or BC (Ewing et al., 2025). Building on these findings, the current analysis examines whether students who took AP Precalculus and scored a 3 or higher were more likely to earn a score of 3 or higher on an AP Calculus Exam the following year. **Appendix Table 2** provides the predicted probabilities of earning scores of 3 or higher on AP Calculus AB and BC Exams for students with and

without prior AP Precalculus participation, and **Figure 4** highlights the corresponding percentage point differences.<sup>3</sup> Predicted probabilities are calculated conditional on attendance at a school where AP Precalculus was offered.

As **Figure 4** shows, students who earned a score of 3 or higher on the AP Precalculus Exam had a consistently higher predicted probability of earning a 3 or higher on AP Calculus AB than comparable students who did not take the AP Precalculus Exam. This pattern is observed across every demographic subgroup included in the analysis. The predicted probability of earning a score of 3 or higher on AP Calculus AB is 4 to 5 percentage points higher for students who earned a 3 or higher on the AP Precalculus Exam, compared with about 2.5 percentage points for AP Calculus BC. Although the AP Precalculus advantage is smaller for AP Calculus BC than for AP Calculus AB, likely because BC students are a more academically advanced and self-selected group, leaving less room for Precalculus performance to differentiate outcomes, the direction of the association remains consistent.

**Figure 4: Percentage Point Difference in AP Calculus Scores of 3 or Higher for Students with Prior AP Precalculus Relative to Peers without AP Precalculus**



*Note.* Values represent percentage point differences in predicted probabilities of earning a score of 3 or higher on AP Calculus Exams. Predicted probabilities are calculated for a reference student with average academic characteristics and demographic values set to White, male, non-first generation, and suburban, unless otherwise specified by subgroup analyses, and assume that AP Precalculus was offered at the student’s school.

<sup>3</sup> Predicted probabilities are derived from logistic regression models estimating the likelihood of earning a score of 3 or higher on AP Calculus AB or BC Exams. Models control for prior academic preparation (PSAT Math scores, high school GPA, the number of other AP STEM and non-AP STEM Exams taken, the number of other 3+ AP STEM’s and 3+ non-AP STEM Exams taken), student demographics (gender, race/ethnicity, first-generation college-going status, and AP fee-waiver status), and school characteristics (urbanicity, the school’s average PSAT score, and whether the school offered AP Precalculus).

Supplemental correlational analyses also show strong associations between AP Precalculus Exam scores and subsequent AP Calculus scores. The correlation with AP Calculus AB is particularly high ( $r = .71$ ), while the relationship with AP Calculus BC is somewhat weaker but still strong ( $r = .59$ ). For comparison, the correlation between SAT Suite of Assessment Math scores and AP Calculus AB scores is lower ( $r = .56$ ; Fletcher et al., 2025).

## Conclusion

A few years into implementation, AP Precalculus appears to be meeting an important need in the advanced STEM pipeline. The results suggest that AP Precalculus may function as a meaningful late-stage entry point into AP STEM. Among students whose first AP STEM experience occurred in 12th grade, AP Precalculus students enrolled in college at rates comparable to peers taking other AP STEM Exams, and at higher rates than students who took no AP STEM Exams or no AP at all. AP Precalculus students also declared STEM majors at rates comparable to peers who took any AP Science Exam or AP Calculus AB, and at notably higher rates than students who took only AP Statistics, Non-STEM AP Exams, or no AP at all. Although AP Computer Science students declared STEM majors at somewhat higher rates, this gap narrowed considerably in persistence to the second year of college. AP Precalculus students persisted in STEM in their second year of college at rates generally comparable to other AP STEMs converging with AP Computer Science despite the higher rate of initial STEM major declaration. Compared with otherwise similar students who did not take AP Exams in high school, AP Precalculus students were more likely both to enter STEM majors and to remain in them.

The findings also provide encouraging evidence that AP Precalculus may support students' subsequent progression in mathematics. Among students who later took AP Calculus AB or BC, those who had previously taken AP Precalculus and earned a 3 or higher were more likely to earn a 3 or higher in AP Calculus than comparable peers who had not taken AP Precalculus. Although these analyses are correlational and should not be interpreted causally, the pattern is consistent across demographic subgroups and across both AP Calculus pathways.

These results align with findings from previous research based on launch year data (Ewing et al., 2025) in which teachers consistently emphasized the course's role in preparing students for future mathematics coursework. In that study, the most common theme in teacher survey responses was the perception that AP Precalculus strengthens readiness for calculus, with educators citing improved conceptual

understanding, more coherent sequencing, and stronger student preparation than in prior precalculus offerings.

Taken together, these findings suggest that AP Precalculus may expand access to advanced mathematics while supporting positive outcomes in subsequent coursework and STEM pathways. Future research should continue to examine longer-term outcomes, including performance in college math courses, degree attainment, and whether these patterns remain consistent over time.

## References

Ewing, M., Wyatt, J., Iarrapino, M., & Jacklin, A. (2025). *AP Precalculus: Who participated and what we learned in launch year*. College Board.  
<https://research.collegeboard.org/media/pdf/AP%20Precalculus%20Who%20Participated%20and%20What%20We%20Learned.pdf>

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<https://appotential.collegeboard.org/media/pdf/Web%20Report%20-%20APP%202025.pdf>

## Appendix

Appendix Table 1: Sample Sizes by Groups and College Outcome Stage

<b>Group</b>	<b>College Enrollment</b> <b>(All HS Grads)</b>	<b>STEM Major at Entry</b> <b>(Enrollees)</b>	<b>STEM Major Persistence</b> <b>(STEM Majors)</b>
<b>AP Precalc Only</b>	7,788	5,265	1,159
<b>AP Calc AB Only</b>	24,527	19,745	6,143
<b>AP Stats Only</b>	26,734	21,741	3,360
<b>AP Science Only</b>	40,122	33,260	7,683
<b>AP CS Only</b>	7,845	5,983	2,077
<b>Non-STEM Only</b>	258,523	187,380	27,495
<b>No AP</b>	498,494	246,158	33,484

**Appendix Table 2. Predicted AP Calculus Scores of 3 or Higher by Prior AP Precalculus Participation**

<b>Exam</b>	<b>Group</b>	<b>No AP Precalculus (%)</b>	<b>AP Precalculus (3+) (%)</b>	<b>Difference (pp)</b>
<b>AP Calculus AB</b>	Overall	84.3	88.3	+4.0
	Black	82.3	86.7	+4.4
	Hispanic	83.7	87.8	+4.1
	Fee Reduction	84.0	88.1	+4.1
	First Generation	84.0	88.0	+4.0
	Rural	79.2	84.3	+5.1
<b>AP Calculus BC</b>	Overall	78.5	81.0	+2.5
	Black	76.1	78.7	+2.6
	Hispanic	78.8	81.3	+2.5
	Fee Reduction	77.1	79.7	+2.6
	First Generation	78.5	81.0	+2.5
	Rural	67.5	70.1	+2.6

Note. Values represent the predicted probability of students earning a score of 3 or higher on AP Calculus AB or BC Exams. Differences are reported in percentage points and compare students who took AP Precalculus and scored a 3 or higher with similar peers who did not.

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