SAT Vs. ACT Scoring

Group 7
Lauren Gomes, Pierre Jackson, Nick Bunescu, Andrew Wieringa
December 5th, 2018

Table Of Contents

Goal of the Project

Our goal for this project was analyze data from both the SAT and ACT tests. By doing so, we want to break down the test scores by region and even by state to specifically see where test takers generally excel and where test takers generally struggle. This ultimately will lead to ideas as to why states and regions may struggle more than others and recommendations as to how to increase their test scores.

Selected Dataset

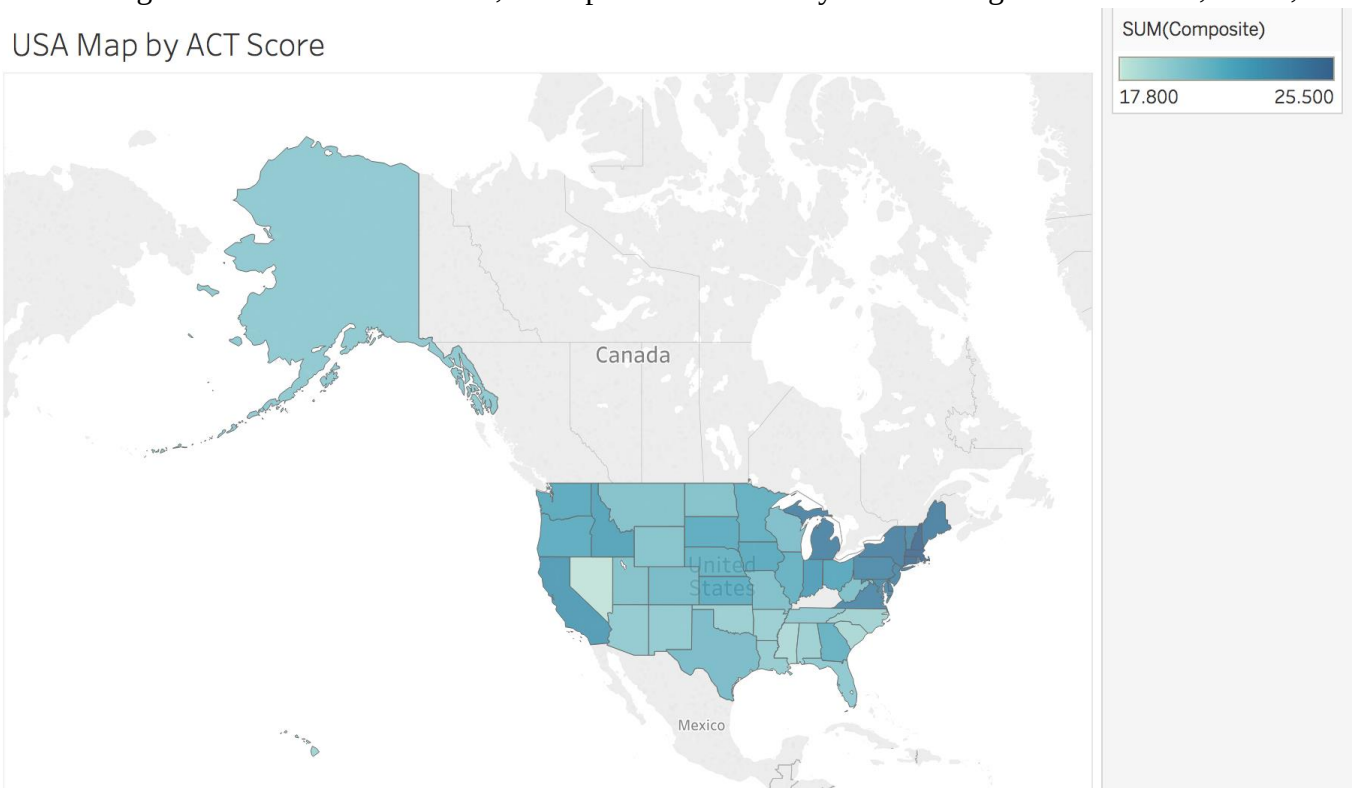
We obtained our data from College board, an official standardized test company that collects yearly results and breaks the scores down by each individual section within the test and the overall composite scores nationally as well as by each state. This data allows us to view national and state averages on the tests from the most recent testing period.

Descriptive Analysis

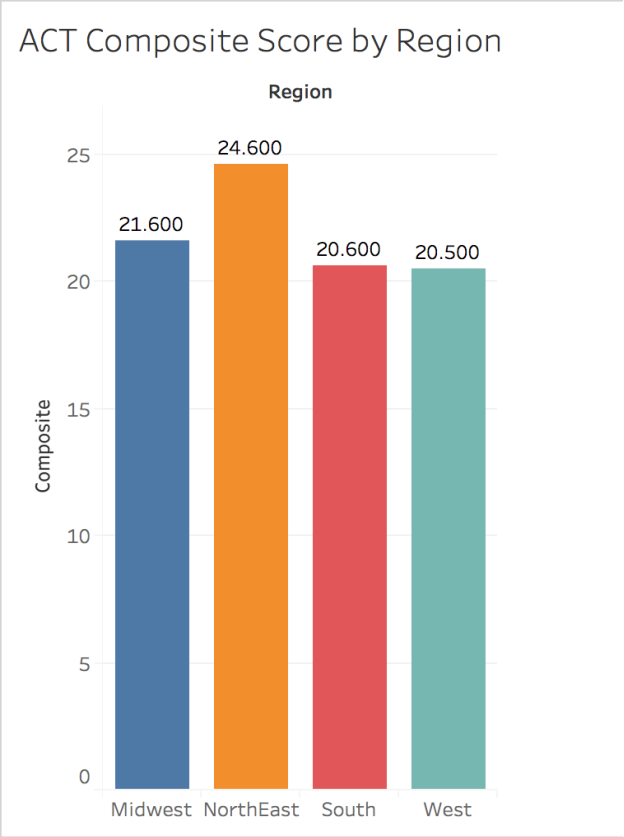
ACT

To begin, we will be looking at ACT scores spread throughout the country to provide a visual and feel to analyze how well students in certain states and regions do the ACT. In the top right of the USA Map by ACT Score visual is a color scale that shows the range of scores from lowest to highest, by going from light to dark respectively. From analyzing this visual, we can estimate that the Northeast, on average, has the highest scores in comparison with the other regions but, we need to take into consideration the amount of test takers that actually take the ACT in the Northeast, as the SAT is far more popular there. In 2017, 25% of standardized test takers in the Northeast took the ACT, which is far below the other percentages of 78% in the Midwest, 71% in the West, and 79% in the South.

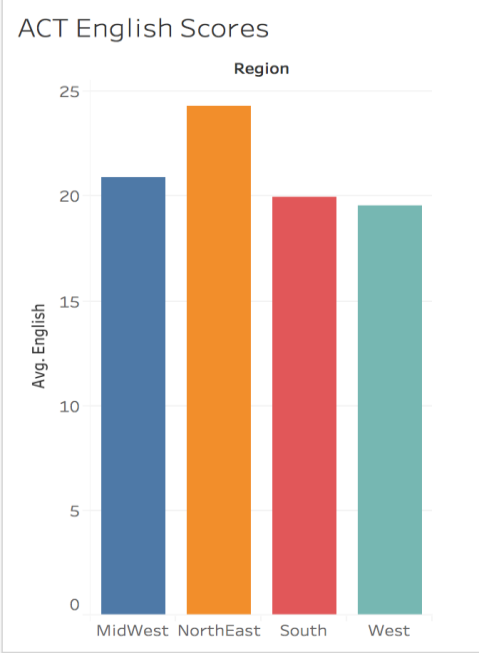
Drilling down further into the data, we separated the country into four regions: Northeast, South,

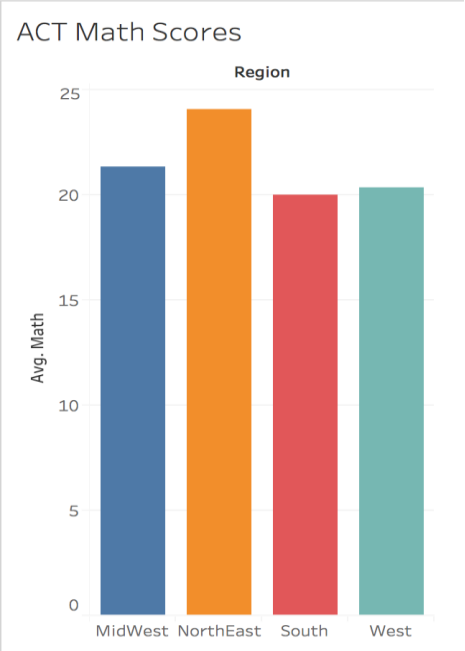


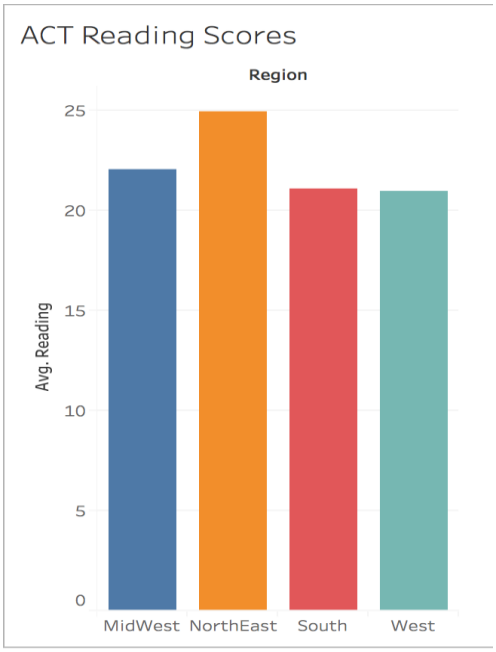
Midwest and West. Like stated above, the Northeast region appears to be the highest scoring region, as we can see this from the ACT Composite Score by Region visual below. The Northeast is leading with a 24.6 composite score, followed by the Midwest at 21.6, with the South and West trailing with 20.6 and 20.5 respectively.

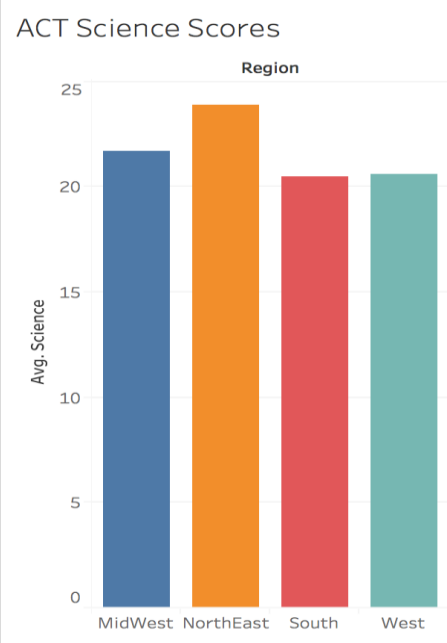


Going a step further into the composite scores of the ACT test takers, we can look by region at the specific tests within the ACT. Looking at the visualizations below, we can see that the Northeast has the highest test scores in all four of the tests within the ACT. While the Midwest is second in every single category, it is interesting to note that the South and West have the lowest scores in every single category, and there is only a tenth of a point difference between them for composite scores, with the South finishing with a score of 20.6 and the West with 20.5. While already establishing that the Northeast's participation rate in the ACT is by far the lowest at 25%, it is amazing to see that they are still the highest scoring region in all five categories.



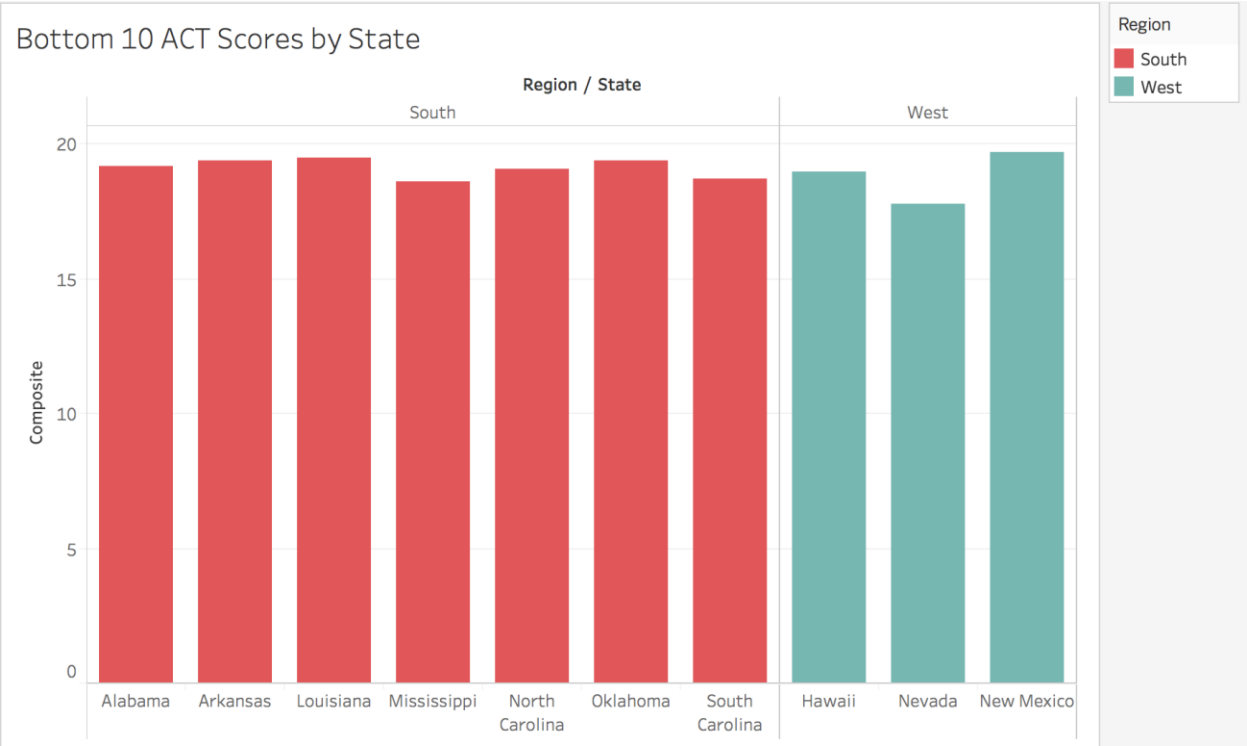






While talking about the highest scoring region in the country, we decided to dive in deeper and look at the worst scoring states in

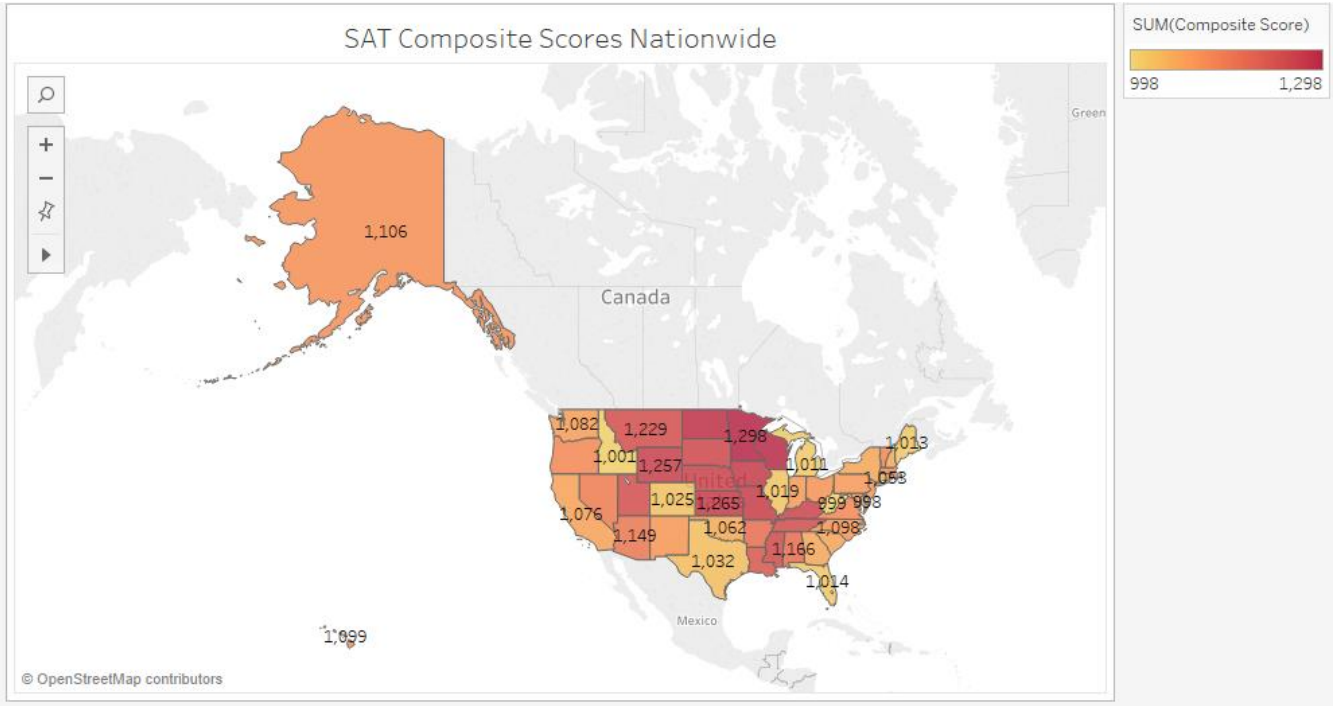
the country. Much like you would imagine from the information already discussed above, the lowest ten scoring states in the country for a composite ACT score all come from the South and West, seven of the ten being from the South, but Nevada being the state with the lowest composite score.



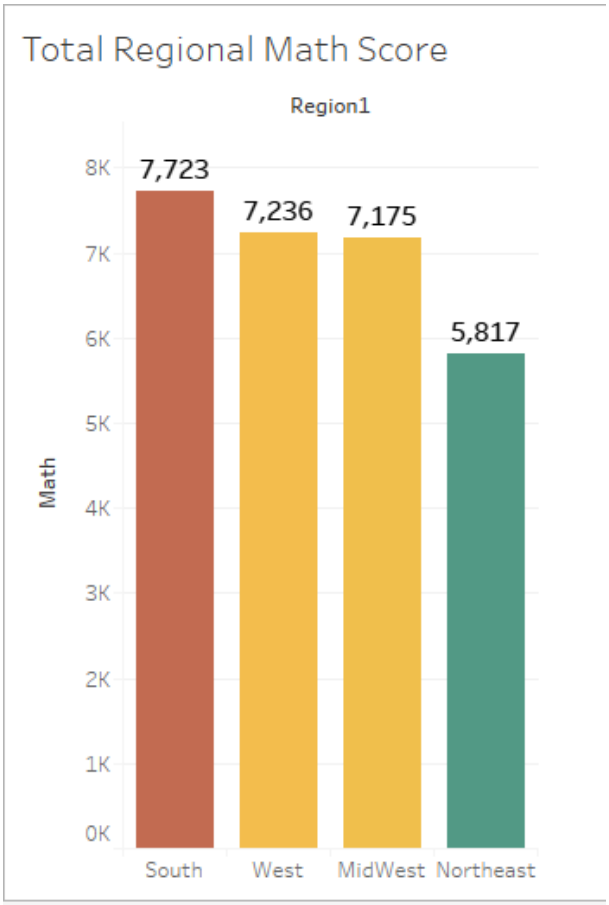
Descriptive Analysis

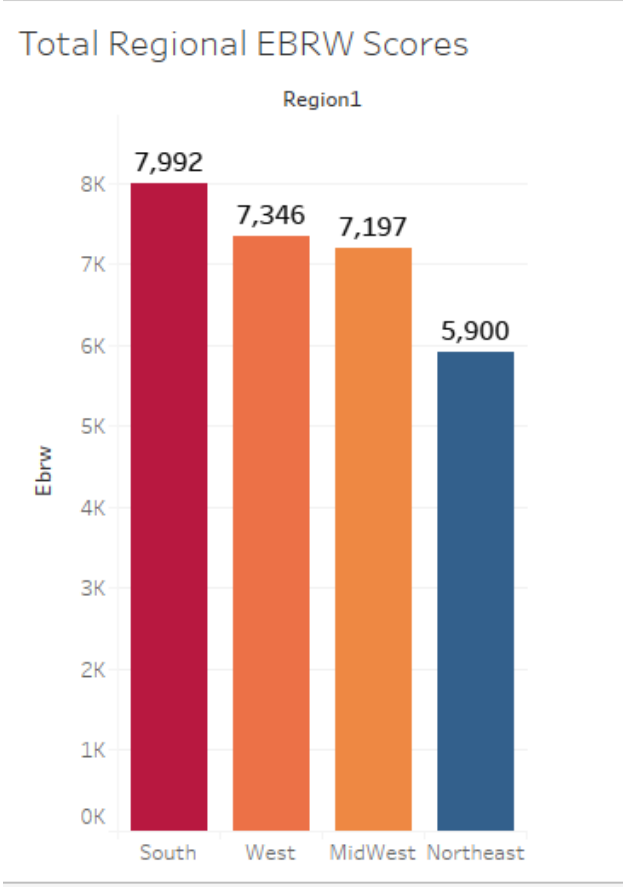
SAT

To begin, we will be looking at SAT scores spread throughout the country to provide a visual and feel to analyze how well students in certain states and regions do the SAT, just as we did with the ACT. In the top right of the USA Map by ACT Score visual is a color scale that shows the range of scores from lowest to highest, by going from light to dark respectively. From analyzing this visual, we can estimate that the Midwest, on average, has the highest scores in comparison with the other regions.

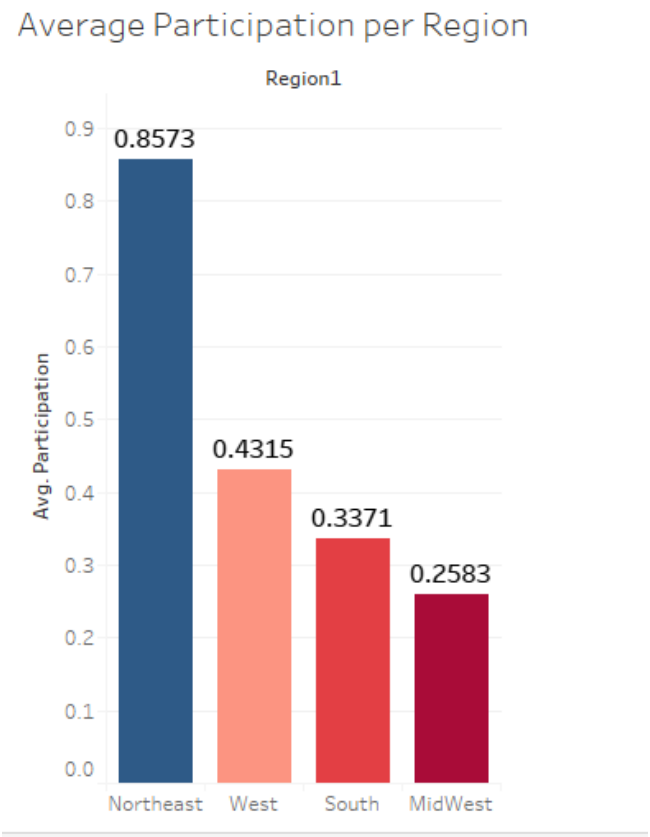


Drilling down further into the data, we separated the country into four regions: Northeast, South, Midwest and West just as we did earlier. Like stated above, the Midwest region appears to be the highest scoring region, as we can see this from the SAT Evidence Based Reading and Writing Score and the Math by Region visual below.





Looking at the visualizations above, we can see that the South has the highest test scores in both test categories within the SAT. While the West is second in both categories, it is interesting to note that the South and West have the highest scores in both categories, while the Northeast is significantly lower in both tests. This is very interesting when the South and West were had the lower scores in the ACT but the higher ones in the SAT.



With the South and the West having the highest tests scores, it is shocking to see that the Northeast has the highest participation rate. The Northeast puts a great deal of emphasis on the standardize tests but to see they are significantly lower in the SAT scores compared to their significantly high participation rate is shocking.

Regression and Correlation

ACT and SAT

The SAT and ACT are two standardized tests that put all students apply to college on an even evaluating field. The students get to choose between the two test and select which one they would like to send to their university or universities. Both tests have their own strategic approach to succeed and they also have their own set of tests within the test itself. The SAT contains three sections that are repeated measuring different levels of these subjects at a different time while the ACT has four sections with allocated time covering four different subjects. Now if both tests require students to excel in time management, strategy and quick thinking could the level of success be correlated among the two tests?

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.441938874							
R Square	0.195309968							
Adjusted R Square	0.178545593							
Standard Error	1.824997368							
Observations	50							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	38.80266111	38.80266111	11.6503	0.001312973			
Residual	48	159.8695389	3.330615394					
Total	49	198.6722						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
SAT	32.30316018	3.156296188	10.23451484	1.18E-13	25.95700136	38.649319	25.95700136	38.649319
ACT	-0.009541428	0.002795406	-3.413253254	0.001313	-0.015161969	-0.003920888	-0.015161969	-0.003920888

As shown by the regression model above, the R squared value is 0.1953, which means the data is not a good fit at all because the model barely explains, if at all, the variability of the data's response around the mean. To have a strong fit, the value of R squared should be at least 50% or higher; the R squared value closer to 1 is where we know that the data is strong in the model. In our case, the R squared value is closest to 0 showing very little fit in the model, we cannot get a

good picture on how they can possibly interact with each other. This could explain why the Northeast and Midwest exceled at the ACT while the South and West exceled in the SAT.

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.99875279							
R Square	0.997507135							
Adjusted R Square	0.997344557							
Standard Error	4.790881218							
Observations	50							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	422479.803	140826.601	6135.555522	7.30886E-60			
Residual	46	1055.816971	22.95254285					
Total	49	423535.62						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.181088094	21.25517355	0.008519718	0.993239173	-42.60335719	42.96553338	-42.60335719	42.96553338
Participation	-1.155612426	3.802236001	-0.303929695	0.762552049	-8.809116539	6.497891687	-8.809116539	6.497891687
EBRW	1.069452845	0.105993007	10.08984339	3.06017E-13	0.856099987	1.282805703	0.856099987	1.282805703
Math	0.930931675	0.086409115	10.77353553	3.60996E-14	0.756999147	1.104864203	0.756999147	1.104864203

Participation		*EBRW*		*Math*		*Composite Score*	
Mean	0.4572	Mean	568.7	Mean	559.02	Mean	1128.26
Standard Error	0.053511044	Standard Error	6.313073575	Standard Error	6.850561723	Standard Error	13.1480676
Median	0.5	Median	553	Median	547	Median	1099
Mode	0.03	Mode	513	Mode	506	Mode	1099
Standard Deviation	0.378380221	Standard Deviation	44.64017135	Standard Deviation	48.44078649	Standard Deviation	92.9708776
Sample Variance	0.143171592	Sample Variance	1992.744898	Sample Variance	2346.509796	Sample Variance	8643.584082
Kurtosis	-1.598026415	Kurtosis	-1.276745918	Kurtosis	-0.937938171	Kurtosis	-1.168863127
Skewness	0.150830248	Skewness	0.36798609	Skewness	0.449938256	Skewness	0.393068955
Range	0.98	Range	138	Range	169	Range	300
Minimum	0.02	Minimum	505	Minimum	486	Minimum	998
Maximum	1	Maximum	643	Maximum	655	Maximum	1298
Sum	22.86	Sum	28435	Sum	27951	Sum	56413
Count	50	Count	50	Count	50	Count	50

The visual above represents the regression model for the SAT, along with the statistical data for each test within the SAT. The mean among the Evidence based Reading and Writing and the Math are very close showing that among the nation there is a level amount of knowledge and skill being absorbed by students. The R squared value is 0.9975 which means there is a very strong fit correlation between the tests and the composite score and the participation. When we look at the Analysis of Variance (ANOVA), we can see that the p-value or significance F is 7.3088E-60 which is less than 0.05. This means we reject the null hypothesis. So, we know that there is a linear relationship between the variables of Math, Evidence Reading and Basic

Writing, and Participation that factor into the composite score. The descriptive statistics show a positive skewness with a flat, wide degree of dispersion. Skewness shows a lack of symmetry in the data which outlines we have a good amount of values that are greater than the mean.

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.999893731							
R Square	0.999787474							
Adjusted R	0.999768993							
Standard E	0.030712362							
Observatic	51							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regressior	4	204.1170027	51.02925067	54099.4392	8.13985E-84			
Residual	46	0.043389461	0.000943249					
Total	50	204.1603922						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0.112254086	0.096328424	1.165326723	0.249894105	-0.081644974	0.306153146	-0.081644974	0.306153146
English	0.245532337	0.011430337	21.4807609	1.2819E-25	0.222524262	0.268540412	0.222524262	0.268540412
Math	0.27923074	0.013909172	20.07529512	2.14793E-24	0.251233028	0.307228451	0.251233028	0.307228451
Reading	0.228262057	0.017053794	13.38482577	1.78628E-17	0.193934551	0.262589563	0.193934551	0.262589563
Science	0.24839716	0.021155341	11.7415813	1.93963E-15	0.205813666	0.290980653	0.205813666	0.290980653

In this visual, we are given the regression model for the ACT. Just as the SAT had a strong positive correlation among the test scores to the composite score and participation, so does the ACT with an R squared value of 0.999787. When we look at the Analysis of Variance (ANOVA), we can see that the p-value or significance F is 8.13985E-84 which is less than 0.05. This means we reject the null hypothesis. We have again in this regression a linear relationship of the independent variables English, Math, Reading, and Science. These two models exemplify the linear relationship of the independent variables that go into each composite score, but the SAT and ACT have no effect on each other; showing that there is no proof of one test's score excelling in a region negatively or positively effect the others. The successfulness of a student in the ACT has no input into the successfulness of the SAT.

Conclusions and Recommendations

With all the data we have retrieved and evaluated, we can see that one of the major trends is that the region with the least amount of participation for both tests had the highest composite scores. This clearly creates an inverse relationship between the participation and composite score and means that the participation in those tests in that region were emphasized inside and outside the classroom. This gave students the opportunity to excel on this one test to give the grades to the university they are applying to. The Northeast has the highest average participation in the SAT had the lowest average composite score.

The most noticeable piece of data that was retrieved was that the two regions that excelled in the SAT did not excel in the ACT. The Northeast had a significantly higher ACT composite score compared to the rest of the regions but had a significantly lowest SAT composite score compared to the rest of the regions. The opposite had occurred for the South. The South had a significantly higher SAT composite score and individual test scores compared to the rest of the regions but had a significantly lower ACT composite score compared to the rest of the regions. This proves how the schools in certain regions are teaching and where they are putting their emphasis on certain subjects.

This becomes helpful to teachers, parents, education systems and many more people. Teachers and administrators can change their emphasis in the classroom to abide by both tests to give students an equal chance to excel on both tests. This also allows parents to see where they should go to increase their children’s success rate on a certain test and where the school and administration put their emphasis on learning certain subjects.

SAT and ACT tests are given across the country but from experience the emphasis put on these tests are not strong. They are taken very lightly, and this is hindering students because these practice tests allow students to find their weaknesses and evaluate which test they prefer. Reports are sent out with scores and feedback, but teachers and counselors should sit down with students to help them understand what these reports means and how they can improve certain sections. These practice tests shouldn't occur once, they should be given every quarter, so the student can watch their progress and get the help they need.

Information on Tests

https://reports.collegeboard.org/sat-suite-program-results/state-results (SAT 2018 scores broken down by states, etc.)