

Centered Model for the SAT Data

```
> sat = read.table("http://www.utstat.toronto.edu/~brunner/302f14/code_n_data/lecture/sat.data")
> summary(lm(GPA ~ VERBAL + MATH, data=sat))
```

Call:

```
lm(formula = GPA ~ VERBAL + MATH, data = sat)
```

Residuals:

Min	1Q	Median	3Q	Max
-2.24875	-0.35113	0.04659	0.38745	1.03527

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.6062975	0.4414062	1.374	0.171
VERBAL	0.0023072	0.0005522	4.178	4.42e-05 ***
MATH	0.0009999	0.0006093	1.641	0.102

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.5484 on 197 degrees of freedom

Multiple R-squared: 0.1161, Adjusted R-squared: 0.1071

F-statistic: 12.93 on 2 and 197 DF, p-value: 5.284e-06

```
> # Center the variables
> attach(sat)
> x1 = VERBAL-mean(VERBAL); x2 = MATH-mean(MATH) # Could do Y = GPA-mean(GPA)
> cmodel = lm(GPA ~ x1 + x2) # Or lm(Y ~ 0 + x1 + x2)
> summary(cmodel)
```

Call:

```
lm(formula = GPA ~ x1 + x2)
```

Residuals:

Min	1Q	Median	3Q	Max
-2.24875	-0.35113	0.04659	0.38745	1.03527

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	2.6300000	0.0387764	67.825	< 2e-16 ***
x1	0.0023072	0.0005522	4.178	4.42e-05 ***
x2	0.0009999	0.0006093	1.641	0.102

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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