Handout 1.5: Proportion of remaining variation for the Grades data

```
/********************** grades2.sas *************************/
options linesize=79 noovp formdlim=' ';
title 'Predicting First-Year GPA from SAT Scores';
title2 'Test quadratic terms, calculate explained variation';

data sat;
     infile 'grades.data' firstobs=2 ;     /* Skipping the header on line 1 */
     input id verbal math gpa;
     sat = verbal+math;
     v2  = verbal**2;
     m2  = math**2;
     label gpa = 'First-year GPA'
           sat = 'Total SAT score'
           v2  = 'Verbal Squared'
           m2  = 'Math Squared';

proc reg;
     model gpa = verbal v2 math m2;
     V2andM2: test v2=m2=0; /* Meaning: Test this null hypothesis about the
                               corresponding regression coefficients */

/* Calculate proportion of remaining variation with proc iml. First do the
contribution of v2 and m2, in two ways. The model with just verbal and math
had an R-squared of 0.116054 (from grades.lst). With verbal-squared and
math-squared, get R-squared = 0.1408 */

proc iml;
     title3 'Calculate explained variation 2 ways';
     print "Proportion of remaining variation explained by V2 and M2";
     a1 = (0.1408-0.116054)/(1-0.116054); print a1;
     /* Now the formula based on the F statistic*/
     n = 200 ; p = 5 ; s = 2 ; F = 2.81;
     a2 = s*f / (n - p + s*F); print a2;

/* Controlling for the other variables, what proportion of the remaining
variation does verbal explain? For a test of one variable, F = t-squared. */

proc iml;
     title3 'Proportion of remaining variation from a t statistic';
     print "Proportion of remaining variation explained by verbal";
     T = 2.13; F = T**2;
     n = 200 ; p = 5 ; s = 1 ;
     a = s*f / (n - p + s*F); print a;
```

grades2.lst

The REG Procedure
Model: MODEL1
Dependent Variable: gpa First-year GPA

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	9.43549	2.35887	7.99	<.0001
Error	195	57.58451	0.29531		
Corrected Total	199	67.02000			

Root MSE	0.54342	R-Square	0.1408
Dependent Mean	2.63000	Adj R-Sq	0.1232
Coeff Var	20.66235		

Parameter Estimates

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	Intercept	1	1.71058	3.08521	0.55	0.5799
verbal		1	0.01310	0.00614	2.13	0.0341
v2	Verbal Squared	1	-0.00000912	0.00000515	-1.77	0.0783
math		1	-0.01247	0.00806	-1.55	0.1235
m2	Math Squared	1	0.00001056	0.00000625	1.69	0.0926

The REG Procedure
Model: MODEL1

Test V2andM2 Results for Dependent Variable gpa

Source	DF	Mean Square	F Value	Pr > F
Numerator	2	0.82878	2.81	0.0629
Denominator	195	0.29531		

Proportion of remaining variation explained by V2 and M2

A1

0.0279949

A2

0.0280132

```
/dos/brunner/429f07/grades > sas grades2 ; cat grades2.lst ; chk
```


The REG Procedure
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Test quadratic terms, calculate explained variation
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Proportion of remaining variation explained by V2 and M2

A1

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A2

0.0280132

Proportion of remaining variation explained by verbal

A

0.0227371