Multiple Regression Example – Prof. Richard B. Goldstein - Statistics

High School GPA	SAT Total	Honors/AP	College GPA
3.20	1350	7	3.20
3.53	1220	10	3.80
2.88	1340	7	2.74
2.94	1490	6	3.25
3.29	1200	9	3.72
2.70	1140	6	2.40
3.24	1210	8	3.50
3.51	1210	7	3.60
3.66	1350	8	3.45
3.81	1450	10	3.93
2.70	1200	9	2.84
2.80	1140	7	2.64
3.86	1280	9	3.63
3.48	1120	7	2.83

Y: College GPA

X_1: HS GPA
X_2: SAT Total
X_3: Honors/AP

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.88218733
R Square	0.77825448
Adjusted R Square	0.71173083
Standard Error	0.26035353
Observations	14

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	3	2.378996	0.792999	11.698913	0.001310
Residual	10	0.677840	0.067784		
Total	13	3.056836			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-1.192098	0.908241	-1.312535	0.218665
High School GPA	0.639554	0.222477	2.874701	0.016535
SAT Total	0.001023	0.000645	1.585722	0.143886
Honors/AP	0.135873	0.064363	2.111026	0.060937

Multiple Regression continued – Prof. Richard B. Goldstein

Y = -1.192 + 0.640 * HS GPA + 0.00102 * SAT + 0.136 * Honors

Correlations:

	High School GPA	*SAT Total*	*Honors/AP*	*College GPA*
High School GPA	1.000000			
SAT Total	0.239062	1.000000		
Honors/AP	0.552276	0.063305	1.000000	
College GPA	0.797026	0.394647	0.686421	1.000000

Which variables should be used?

(1) By correlations alone: HS GPA, then Honors/AP and SAT Total

(2) Considering all possible Regressions:

Variable(s)	adjusted R^2
HS GPA	0.605 *
SAT Total	0.085
Honors/AP	0.427
HS GPA & SAT Total	0.621
HS GPA & Honors/AP	0.672 *
SAT Total & Honors/AP	0.521
All Three	0.712 *

Considerations:

Step-up regression
Step-down regression
All combinations as above
Avoid highly correlated variables