What Statistic to Use

Independent Variable	Dependent Variable	Statistic	Kind of question	Sample
1 nominal	1 nominal	Chi-square	Difference	Is there a difference between urban and rural students whether they attend college or not?
1 nominal IV (2 levels or groups)	1 scale DV	Independent t-test	Difference	Is there a difference between boys and girls on a test of creativity?
1 Nominal or ordered (3+ levels or groups)	1 scale DV	One way ANOVA	Difference (post hoc tests tell direction)	Is there a difference among students who use paper/pencil, a computer, or an Alpha keyboard on score of writing proficiency?
2 Nominal or ordered (3+ levels or groups)	1 scale DV	Factorial ANOVA	Difference (post hoc tests analyze simple effects)	Are there differences in the performance of boys and girls assigned to three different teaching method groups on a math achievement test? (2 X 3)
one+ IV's is pre-test or confounding variable		ANCOVA	Difference (look at "estimated marginal means")	Is there a difference among students who use paper/pencil, a computer, or an Alpha keyboard on a score of writing proficiency adjusting for prior English grades? (or adjusting for pre-test writing scores?)
time is one IV	multiple measures of same group-- within subjects	Repeated Measures ANOVA	Difference	Are there differences in the test scores for Mrs. Smith's students in September to their test scores in June?
uses both within group & between group factors		Mixed ANOVA	Difference	Are there differences in the test scores for Mrs. Smith and Mrs. Jones' students when assessed in September, January, and June?
2+ levels or groups of IV	2+ scale DV's	MANOVA	Difference	Is there a difference between those required to attend counseling and those who are not required on the six subscales of the Social Understanding Survey?
1 Scale IV	1 Scale DV	Correlation	Association	Is there a significant relationship between height and IQ?
Several Scale or dichotomous IV	1 Scale DV	Multiple regression	Association	What is the best model to predict male life expectancy from the factors of literacy rate, calorie intake, and infant mortality?
2+ scale or dichotomous IV	1 nominal DV –can have several levels	Discriminant Analysis	Association (more assumptions)	What combination of gender, parents' education, mosaic, and visualization test best distinguishes students who will take algebra 2 from those who do not?
2+ scale or dichotomous	1 dichotomous DV with 2 levels	Logistic Regression	Association	Is there a combination of gender, parents' education, mosaic, and visualization test that predicts whether a student will take algebra 2?

Statistic	what it does	assumptions	remember
one way ANOVA	looks at difference in groups with 3+ levels on the scale DV	1. **normal distribution of DV** for each group (robust—can do boxplots or check skewness) 2. variances of the DV equal across groups –**homogeneity of variance** (if groups = robust; if groups, not =, check Levene's or Box's) 3. **independence of observation** (design)	--look at interaction first --if F sig and you have more than 2 groups, post-hoc to determine strength or direction = simple effects (use Games Howell if Levene's is sig; other --if interaction not sig, look at main effects
factorial ANOVA	looks at difference in combination of two+ groups (with 3+ levels) on the scale DV	same ↑	report by levels of IV (ex.= 2 X 3 means two levels of first IV, 3 levels of second) if interaction sig, do post hocs if more than 2 levels
ANCOVA	for studies with pretest or confounding variables	same ↑ except add 4. there must be a **linear relationship between the covariates and the DV** (scatterplot) 5. regression slopes for the covariates need to be the same for each group –**homogeneity of regression slopes** (F test on interaction of IV with covariate – if sig, violated)	run ANOVA first to check for homogeniety of regression slope, then run ANCOVA if interaction sig, do post hocs if more than 2 levels
repeated measures ANOVA	when same measurement is made several times on each subject	same as ANOVA except add 4. **sphericity** – homogeniety of variances and covariances (use Mauchly's or Box's test) – spread of scores and spread within scores is similar enough to be compared	if Mauchly's is sig, use Greenhouse-Geiser correction if epsilon < .75; use Huynh-Feldt correction if epsilon > .75
mixed ANOVA	when testing both effects of between and within subjects effects	same as ↑ sphericity must hold for levels of within subjects variable at each level of between subjects variable (Box's M)	same ↑
MANOVA	multiple DV's analyzed together	independence of observation multivariate normality homogeneity of variance/covariance (robust if groups nearly =, that is N of largest group no more than 1.5 times the N of smallest group)	if Box's not violated, use Wilk's lambda if 3+ groups if two groups, use Hotelling Trace
Principal component analysis	to group together underlying constructs	conditions: adequate sample size assumptions: 1. independent sampling (design) 2. variables related linear in pairs (matrix scatterplots & determinant should be more than .00001) 3. many variables moderately correlated (look at KMO -- .above .7 okay & Bartlett's should be sig – less than .05)	find groups and then do reliability analysis on full scale, each group of constructs
Exploratory Factor Analysis/ reliability	to understand the relationship between underlying constructs	less effected by sample size; otherwise same ↑	find groups and then do reliability analysis on full scale, each group of constructs Cronbach's alpha should be between .6 and .9
Multiple regression	looks at the association of multiple scale IV's on DV	eight assumptions	