Summary Table for Statistical Techniques

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|  | Inference | Parameter | Statistic | Type of  Data | Examples | Analysis | Minitab  Command | Conditions |
| 1 | Estimating a  mean | One  population  mean µ | sample mean | numerical | What is the average  weight of adults?  What is the average  cholesterol level of  adult females? | 1-sample t-interval | Stat  >Basic  statistics  >1-sample t | data approximately normal  or  have a large sample  size (n ≥ 30) |
| 2 | Test about a  mean | One  population  mean µ | sample mean | numerical | Is the average GPA  of juniors at Penn  State higher than  3.0?  Is the average  Winter temperature  in State College  less than 42ْ F? | Ho: µ = µo  Ha: µ ¹ µoor Ha: µ > µo  or Ha: µ < µo  The one sample t test: | Stat  >Basic  statistics  >1-sample t | data approximately normal  or  have a large sample  size (n ≥ 30) |
| 3 | Estimating a  proportion | One  population  proportion  p | sample  proportion | categorical  (binary) | What is the  proportion of males  in the world?  What is the  proportion of  students that smoke? | 1-proportion Z-interval | Stat  >Basic  statistics  >1-sample  proportion | n≥ 10 and n (1-) ≥ 10 |
| 4 | Test about a  proportion | One  population  proportion  p | sample  proportion | categorical  (binary) | Is the proportion  of females different  from 0.5?  Is the proportion of  students who fail  Stat200 less than  0.1? | Ho: p = po  Ha: p ¹ poor Ha: p > po  or Ha: p < po  The one proportion Z-test: | Stat  >Basic  statistics  >1-sample  proportion | n po³ 10andn (1-po) ³ 10 |
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| 5 | Estimating the  difference of  two means | difference in  two  population  means  µ1-µ2 | difference in  two sample  means | numerical | How different are  the mean GPAs of  males and females?  How many fewer  colds do vitamin C  takers get, on  average, than non  vitamin C takers? | two-sample t-interval      See text, page 445, for  the s.e. of the difference | Stat  >Basic  statistics  >2-sample t | independent samples from  the two populations  data in each sample are  about normal or large  samples (ni ≥ 30) |
| 6 | Test to  compare two  means | difference in  two  population  means  µ1-µ2 | difference in  two sample  means | numerical | Do the mean pulse  rates of exercisers  and non-exercisers  differ?  Is the mean EDS  score for dropouts  greater than the  mean EDS score for  graduates? | Ho: µ1 = µ2  Ha: µ1 ¹ µ2or Ha: µ1 > µ2  or Ha: µ1 < µ2  The two sample t test:  See text, page 445, for  the s.e. of the difference | Stat  >Basic  statistics  >2-sample t | independent samples from  the two populations  data in each sample are  about normal or large  samples (ni ≥ 30) |
| 7 | Estimating a  mean with  paired data | mean of  paired  difference  µD | sample mean  of  difference | numerical | What is the  difference  in pulse rates, on the  average, before and  after exercise? | paired t-interval | Stat  >Basic  statistics  >Paired t | differences approximately  normal  or  have a large number  of pairs (n ≥ 30) |
| 8 | Test about a  mean with  paired data | mean of  paired  difference  µD | sample mean  of  difference | numerical | Is the difference in  IQ of pairs of twins  zero?  Are the pulse rates  of people higher  after exercise? | Ho: µD = 0  Ha: µD ¹ 0or Ha: µD > 0  or Ha: µD < 0 | Stat  >Basic  statistics  >Paired t | differences approximately  normal  or  have a large number  of pairs (n ≥ 30) |

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| 9 | Estimating the  difference of  two  proportions | difference in  two  population  proportions  p1-p2 | difference in  two sample  proportions | categorical  (binary) | How different are  the percentages of  male and female  smokers?  How different are  the percentages of  upper- and lower-  class binge  drinkers? | two-proportions Z-interval      See notes for s.e. formula | Stat  >Basic  statistics  >2 proportions | independent samples  from the two populations  n≥ 10 and (1-n)≥ 10  for each sample |
| 10 | Test to  compare two  proportions | difference in  two  population  proportions  p1-p2 | difference in  two sample  proportions | categorical  (binary) | Is the percentage of  males with lung  cancer higher  than the percentage  of females with lung  cancer?  Are the percentages  of upper- and lower-  class binge drinkers  different? | Ho: p1 = p2  Ha: p1 ¹ p2or Ha: p1 > p2  or Ha: p1 < p2  The two proportion z test:    See notes for s.e. formula | Stat  >Basic  statistics  >2 proportions | independent samples  from the two populations  n≥ 10 and (1-n)≥ 10  for each sample |
| 11 | Relationship  in a 2-way  table | relationship  between two  categorical  variables  or  difference in  two or more  population  proportions | the observed  counts in a  two-way table | categorical | Is there a  relationship  between smoking  and lung cancer?  Do the proportions  of students in each  class who smoke  differ? | Ho: The two variables are  not related  Ha: The two variables are  related  The chi-square statistic: | Stat  >Tables  >CrossTabu-  lation >Chi-  Square analysis for  For summarized  Data: Stat>  Tables> Chi-  Square. | all expected counts should  be greater than 1  at least 80% of the cells  should have an expected  count greater than 5 |

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| 12 | Test about a  slope | slope of the  population  regression  line b1 | sample  estimate of  the slope  b1 | numerical | Is there a linear  relationship between  height and weight of  a person? | Ho: b1= 0  Ha: b1 ¹ 0or Ha: b1 > 0  or Ha: b1 < 0  The t test with n-2 degrees of  freedom: | Stat  >Regression  >Regression | the form of the equation  that links the two variables  must be correct  the error terms are normally  distributed  the errors terms have  equal variances  the error terms are  independent of each other |
| 13 | Test to  compare  several  means | Population  means of the  k populations  µ1,µ2,….., ,µk | Sample means  of the k  populations  x1,x2,….., ,xk | numerical | Is there a difference  between the mean  GPA of Freshman,  Sophomore, Junior  and Senior classes? | Ho: µ1=µ2=˙˙˙ =µk  Ha: not all the means are  equal  The F test for one-way  ANOVA: | Stat  >ANOVA  >Oneway | each population is normally  distributed  independent samples from  the k populations  equal population standard  deviations |