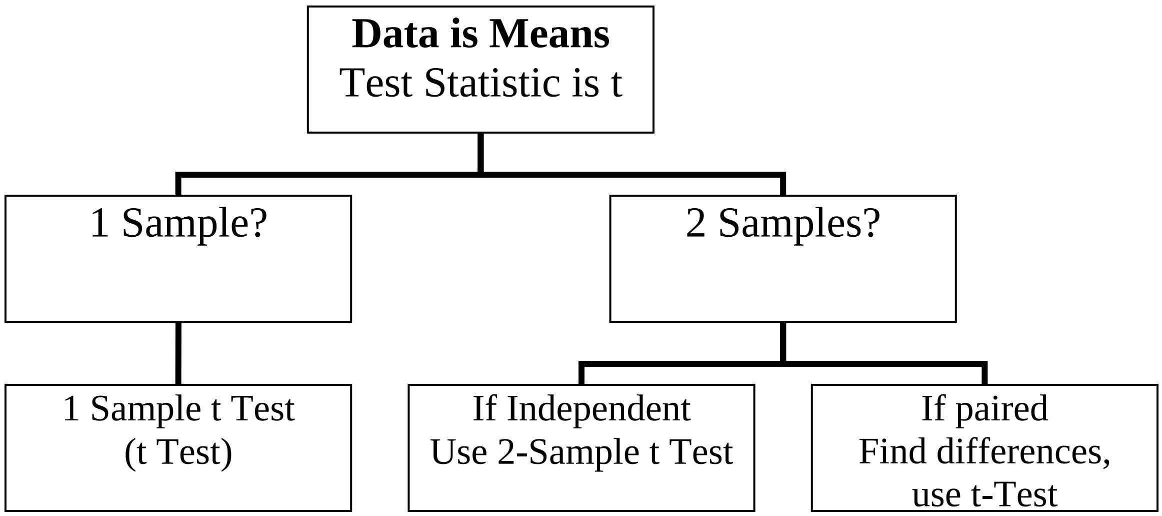
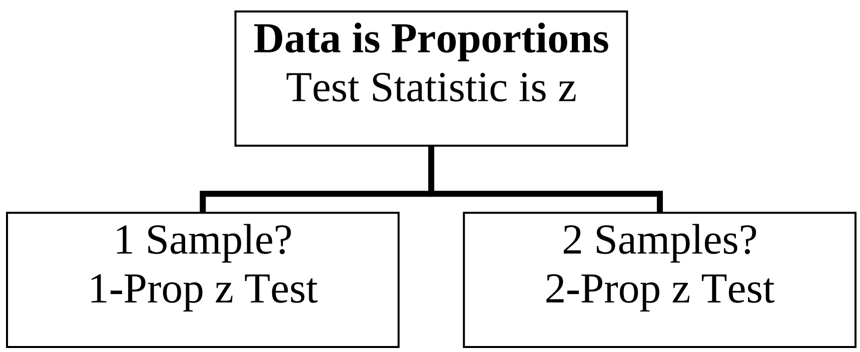
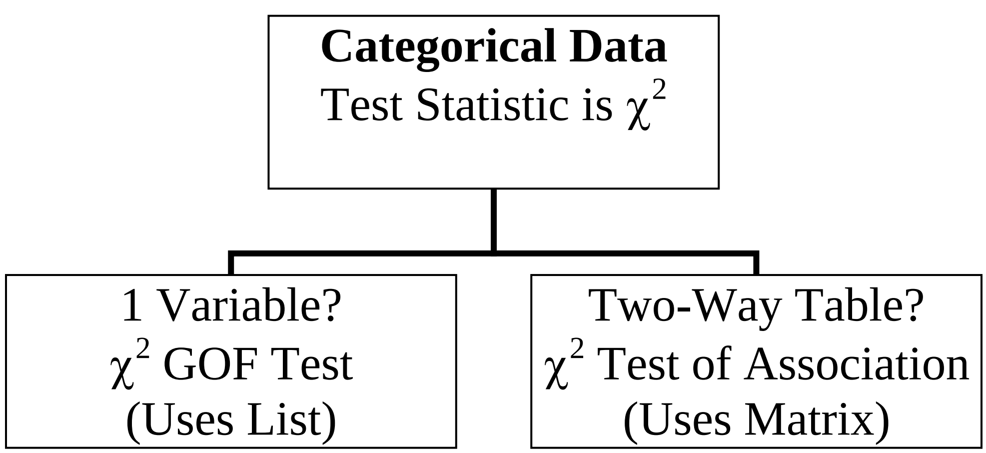
AP Statistics: Choosing the Correct Hypothesis Test







AP Statistics – Hypothesis Test Statistics

Name	Formula	Conditions or Assumptions*
One-sample z-test	$z = \dfrac{\bar{x} - \mu}{\sigma / \sqrt{n}}$	(Normal distribution **or** $n > 30$) **and** σ known.
One-sample t-test	$t = \dfrac{\bar{x} - \mu_0}{s / \sqrt{n}}$	(Normal population **or** $n > 30$) **and** σ unknown df = n-1
Paired t-test	$t = \dfrac{\bar{d} - d_0}{s_d / \sqrt{n}}$	(Normal population of differences **or** $n > 30$) **and** σ unknown df = n-1
One-proportion z-test	$z = \dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0(1-p_0)}{n}}}$	$n \cdot p > 10$ **and** $n(1-p) > 10$
Two-proportion z-test	$z = \dfrac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$ $\hat{p} = \dfrac{x_1 + x_2}{n_1 + n_2}$	$n_1 \cdot p_1 > 5$ AND $n_1(1 - p_1) > 5$ **and** $n_2 \cdot p_2 > 5$ **and** $n_2(1 - p_2) > 5$ **and** independent observations
Two-sample t-test	$t = \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$	(Normal populations **or** $n_1+n_2 > 30$) **and** independent observations **and** σ_1 **and** σ_2 unknown
Chi-Square Test	$\chi^2 = \sum_{i=1}^{n} \dfrac{(O_i - E_i)^2}{E_i}$	All expected counts > 0 **and** no more than 20% are 5 or less df = n-1 for Goodness of Fit test df = (r-1)(c-1) for Test of Association

***** Note that it is common to all tests that we require the sample to be an SRS

Definition of Symbols Used

n = sample size	n_1 = sample 1 size	p_1 = proportion 1
$\bar{x}$ = sample mean	n_2 = sample 2 size	p_2 = proportion 2
s = sample standard deviation	s_1 = sample 1 std. deviation	μ_1 = population 1 mean
μ_0 = population mean	s_2 = sample 2 std. deviation	μ_2 = population 2 mean
σ = population standard deviation	$\bar{d}$ = sample mean of differences	O = observed count
t = t statistic	d_0 = population mean difference	E = expected count
df = degrees of freedom	s_d = std. deviation of differences	

AP Statistics – Confidence Interval Formulas

Name	Formula	Conditions or Assumptions
One-sample t interval	$\bar{x} \pm t^* \frac{s}{\sqrt{n}}$	(Normal population **or** $n > 30$) **and** σ unknown df = n-1
One-proportion z interval	$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$	$n \cdot \hat{p} > 10$ **and** $n(1 - \hat{p}) > 10$
Two-sample t interval	$(\bar{x}_1 - \bar{x}_2) \pm t^* \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	(Normal populations **or** $n_1+n_2 > 40$) **and** independent observations **and** σ_1 **and** σ_2 unknown
Two-proportion z interval	$(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$	$n_1 \cdot \hat{p}_1 > 5$ AND $n_1(1 - \hat{p}_1) > 5$ **and** $n_2 \cdot \hat{p}_2 > 5$ **and** $n_2(1 - \hat{p}_2) > 5$ **and** independent observations

*** Note that it is common to all intervals that we require the sample to be an SRS**

Definition of Symbols Used

n = sample size	$\bar{x}_1$ = sample 1 mean	$\hat{p}$ = sample proportion
$\bar{x}$ = sample mean	$\bar{x}_2$ = sample 2 mean	$\hat{p}_1$ = sample proportion 1
s = sample standard deviation	n_1 = sample 1 size	$\hat{p}_2$ = sample proportion 2
σ = population standard deviation	n_2 = sample 2 size	
t^* = t-statistic critical value	s_1 = sample 1 std. deviation	
z^* = z-statistic critical value	s_2 = sample 2 std. deviation	
df = degrees of freedom		

Commonly used z* values:

C-Level	z* value
80%	1.282
90%	1.645
95%	1.960
98%	2.326
99%	2.576