

Statistics Formula Sheet

1. Confidence interval for μ :

a) $\left\langle \bar{x} - z_{\alpha/2} \frac{S}{\sqrt{n}}, \bar{x} + z_{\alpha/2} \frac{S}{\sqrt{n}} \right\rangle$ if S is known. $z_{\alpha/2}$ is from the Z chart.

b) $\left\langle \bar{x} - t_{\alpha/2, n-1} \frac{S}{\sqrt{n}}, \bar{x} + t_{\alpha/2, n-1} \frac{S}{\sqrt{n}} \right\rangle$ if S is unknown. $t_{\alpha/2}$ is from the t_{n-1} . (Use $z_{\alpha/2}$ if $n > 30$)

2. Confidence interval for S : The denominator comes from C_{n-1}^2 chart.

$$\left\langle \sqrt{\frac{(n-1)s^2}{C_{\alpha/2, n-1}^2}}, \sqrt{\frac{(n-1)s^2}{C_{1-\alpha/2, n-1}^2}} \right\rangle$$

3. Confidence interval for a population proportion:

$$\left\langle \hat{p} - z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}, \hat{p} + z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \right\rangle$$

4. Hypothesis Testing:

Be sure to include:

H_0 and H_a (Always put equality in H_0)

The value of the data test statistic (z, t, or whatever)

A properly labeled picture for any non-computer problem

The p-value for any computer problem

Reject or Fail to Reject

The conclusion in words

$$z = \frac{\bar{x} - \mu_0}{S / \sqrt{n}} \quad t = \frac{\bar{x} - \mu_0}{s / \sqrt{n}} \quad C^2 = \frac{(n-1)s^2}{S_0^2} \quad z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

Determining the probability of Type II Error if the true mean is μ_1 and not μ_0

1. Testing $H_0: \mu = \mu_0$
 $H_a: \mu > \mu_0$

2. Testing $H_0: \mu = \mu_0$
 $H_a: \mu < \mu_0$

$$P(\text{Type II Error}) = P\left(Z < z_{\alpha} - \frac{\mu_1 - \mu_0}{S / \sqrt{n}}\right)$$

$$P(\text{Type II Error}) = P\left(-z_{\alpha} + \frac{\mu_1 - \mu_0}{S / \sqrt{n}} < Z\right)$$