Exam 1 Cheatsheet

Econ B2000, MA Econometrics

Shay Culpepper, CCNY

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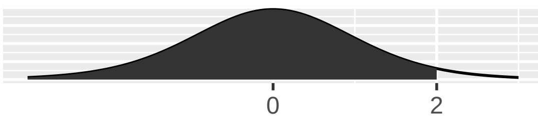
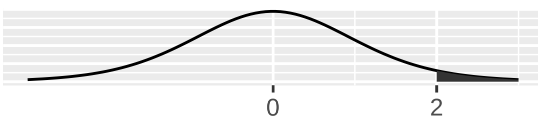
Using the Normal and Student's T to find p-values

What will be helpful in this section: `pnorm`, `qnorm`, `pt`, `qt`, and a normal distribution / students t distribution graph to visualize. 2 ways to do it. 1) You can calculate the z score. $z = \frac{\bar{x}-\mu}{\sigma}$, or specify mean and sd in the function itself. pnorm and pt default to the lower tail.

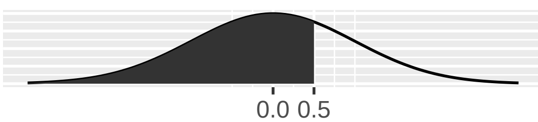
`pt(2, df = 10)` gives you the area of the shaded region in the figure below.



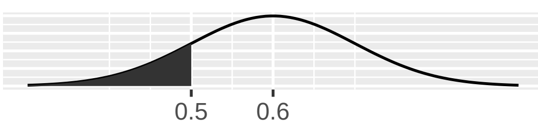
`pt(2, df = 10, lower.tail = FALSE)` gives you the area of the shaded region in the figure below.



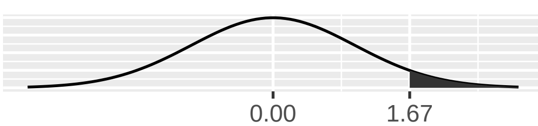
`pnorm(0.5)` gives you the area of the shaded region in the figure below.



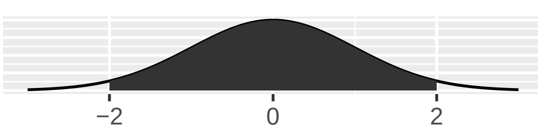
`pnorm(0.5, mean = 0.6, sd = 0.1)` gives you the area of the shaded region in the figure below.



`pnorm(1.67, lower.tail = FALSE)` gives you the area of the shaded region in the figure below.



`pnorm(2) - pnorm(-2)` gives you the area of the shaded region in the figure below.



Statistics from given numbers (no datasets in R required)

Means

These assume an unknown sigma

$$E = (t_{\alpha/2})\frac{s}{\sqrt{n}} \qquad df = n-1 \qquad t = \frac{\bar{x}-\mu}{\frac{s}{\sqrt{n}}} \qquad n = \left(\frac{z_{\alpha/2}s}{E}\right)^2 \qquad SE = \frac{s}{\sqrt{n}}$$

Difference in means

These assume variances are different and unknown

$$SE = \sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}} \qquad E = t_{\alpha/2}SE \qquad df = min(n_1, n_2) - 1 \qquad t = \frac{(\bar{x}_1-\bar{x}_2)-(\mu_1-\mu_2)}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}}$$

Population proportion

$$SE = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \qquad E = z_{\alpha/2}SE \qquad z = \frac{\hat{p}-p}{\sqrt{\frac{p(1-p)}{n}}} \qquad n = p(1-p)\left(\frac{z_{\alpha/2}}{E}\right)^2$$

Difference in proportions

$$SE = \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} \qquad E = z_{\alpha/2}SE \qquad \bar{p} = \frac{x_1+x_2}{n_1+n_2} \qquad z = \frac{(\hat{p}_1-\hat{p}_2)-(p_1-p_2)}{\sqrt{\bar{p}\,(1-\bar{p})\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$

Hypothesis Test

$$\begin{array}{rrrr}
H_0 & H_a & Test & Reject\ H_0 if... \\
\mu \geq a & \mu < a & left-tail & test\ stat < -Z_\alpha \\
\mu \leq a & \mu > a & right-tail & test\ stat > Z_\alpha \\
\mu = a & \mu \neq a & two-tail & |test\ stat| > Z_\alpha
\end{array}$$

Regression Analysis from given data (no datasets in R required)

Statistics using Datasets (R required)

Regression Analysis using Datasets (R Required)