Intructions Report

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Getting Started with Equations in Markdown

Equations and mathematical symbols can be easily added to a markdown file. A fraction of two-thirds can be written as $\frac{2}{3}$. Other expressions are, e.g., $\hat{\lambda} = 1.02$ and $\sqrt{4} = 2$. The formulas so far were inline formulas. Formulas can appear also appear on their own line (in so-called display math mode)

$$\alpha, \beta, \gamma, \Gamma$$
$$a \pm b$$
$$x \geq 15$$

and

$$a_i \geq 0 \quad \forall i$$

An $n \times m$ matrix $\mathbf{A}$ can be shown as

$$ {}_n\mathbf{A}_m = \begin{pmatrix} a_{11} & a_{12} & \cdots & a_{1m} \\ a_{21} & a_{22} & \cdots & a_{2m} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \cdots & a_{nm} \end{pmatrix} $$

Other Examples for Formulas and Equations

The binomial probability:

$$f(y \mid N, p) = \frac{N!}{y!(N-y)!} \cdot p^y \cdot (1-p)^{N-y} = \begin{pmatrix} N \\ y \end{pmatrix} \cdot p^y \cdot (1-p)^{N-y}$$

To write the mean of n observations of variable x, you can use:

$$\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$$

Note that this equation looks quite nice above where it's in display math mode. It is more compact but not quite as nice looking if we present it using inline mode, e.g., $\bar{x} = \frac{1}{n} \sum_{i=1}^{n} x_i$.

Let us do the same with the equation for variance. First the inline version, which is $\sigma^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}$. And then the display mode version:

$$\sigma^2 = \frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}$$

Next, it is good to look at the equation for covariance to see how it is just a generalization of variance to two variables. An inline version of the equation is $\text{cov}_{x,y} = \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})/(n-1)$. And, the display mode is:

$$\text{cov}_{x,y} = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{n-1}$$

And, finally, we will end with the standard deviation. Here is the inline version, $\sigma = \sqrt{\sum_{i=1}^{n} (x_i - \bar{x})^2/(n-1)}$. And here is the display version.

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}.$$

These equations are coded in LaTeX. There helpful online editors to build up the equation, such as http://visualmatheditor.equatheque.net/VisualMathEditor.html. Make your equation there and copy the code into the RMarkdown document in between dollar signs (1 or 2 on either end depending on whether you want the equation in line or in display mode).