Math in LaTeX

Attila Gyetvai

January 19, 2014

1 Environments, equations

This is an inline math environment: $f(x) = 2x$.

This is a dedicated math environment:

$$f(x) = 2x$$

You can do it like this too[1]:

$$f(x) = 2x$$

The best way to write dedicated math expressions is the equation environment:

$$f(x) = 2x \tag{1}$$

For no numbering, use the starred version:

$$f(x) = 2x$$

Systems of equations are put in the align environment:

$$f(x) = 2x$$
$$g(x) = 9\,x$$

For short texts in between:

$$h(x) = 0.1x$$

[1] However, it is fragile, so you should avoid it.

2 Formulae, symbols

$$
\begin{aligned}
a^2 + b^2 &= c^2 \\
a_1^2 + a_2^2 &= a_3^2 \\
a_{11}^2 + a_{12}^2 &= a_{13}^2 \\
\sin x = \alpha &\iff x = \arcsin x \\
\Pi &\implies \pi \\
\frac{2x}{4y} &= \frac{x}{2y} \\
1/2 &\neq \mathbb{N} \\
\log x \to 0 \text{ as } x \to -\infty &\iff \lim_{x \to -\infty} x = 0
\end{aligned}
$$

3 Operators

$$
\begin{aligned}
y &= \beta_0 + \beta_1 x_1 + u \\
y &= \beta_0 + \beta_1 x_1 + \beta_2 x_1^2 + u \\
y &= \beta_0 + \sum_{i=1}^{j} \beta_i x_i + u \\
\hat{y} &= \hat{\beta}_0 + \sum_{i=1}^{j} \hat{\beta}_i x_i \\
\widehat{educ} &= \hat{\beta}_0 + \sum_{i=1}^{j} \hat{\beta}_i x_i \\
\bar{y} &= \beta_0 + \sum_{i=1}^{j} \beta_i \bar{x}_i + u
\end{aligned}
$$

Inline version: $y = \beta_0 + \sum_{i=1}^{j} \beta_i x_i + u$. Inline version with full typography: $y = \beta_0 + \sum_{i=1}^{j} \beta_i x_i + u$.

4 Vectors, matrices

$$
\begin{matrix} 1 & 2 \end{matrix} \qquad \begin{matrix} 1 \\ 2 \end{matrix} \qquad \begin{matrix} 1 & 2 \\ 1 & 2 \end{matrix}
$$

$$
\begin{pmatrix} 1 & 2 \end{pmatrix} \qquad \begin{bmatrix} 1 \\ 2 \end{bmatrix} \qquad \begin{vmatrix} 1 & 2 \\ 1 & 2 \end{vmatrix}
$$

All together

$$\begin{pmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \iff \sum_{i=1}^{2} \alpha_{i1}\, x_1 + \sum_{i=1}^{2} \alpha_{i2}\, x_2$$

5 Theorems

Theorem 1. *All markers are blue.*

Proof. By counterexample. You can buy black ones in the store. ■

Problem 2 (Varian 32.116)**.** Two guys, x and y play the chicken game.

Assumption 1. There might be pink markers.

Summary 3. Theorems in LaTeX are cool.

6 Regression outputs

6.1 Equation

$$\widehat{wage} = \underset{(.77)}{-3.39} + \underset{(.0538)}{.6443}\, educ + \underset{(.0110)}{.0701}\, exper$$
$$n = 526, \quad R^2 = .2252$$

6.2 Table

wage	Coeff.	St.e.	*t*-stat.	*p*-value	95% conf.	int.
educ	.6443	.0538	11.97	.000	.5386	.7500
exper	.0701	.0110	6.39	.000	.0485	.0917
constant	-3.39	.77	-4.42	.000	-4.90	-1.88
$n = 526, \quad R^2 = .2252$						

My way

Dependent variable: *wage*		
	Coefficient	*t*-stat.
educ	$.6443^{***}$ (.0538)	11.97
exper	$.0701^{***}$ (.0110)	6.39
constant	-3.39^{***} (.77)	-4.42
$n = 526$	$R^2 = .2222$	

Table 1: OLS regression. Standard errors in parentheses. ***: significance at the 1% level.