Learning Latex *

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Abstract

In this article we learn the art of composing scientific documents using the elegant LaTeXtypesetting language.

We prove that

$$\frac{(n_1 + n_2 + \cdots + n_m)!}{n_1!\,n_2!\ldots n_m!} = \binom{n_1+n_2}{n_2}\binom{n_1+n_2+n_3}{n_3}\cdots\binom{n_1+n_2+\cdots+n_m}{n_m}. \quad (1)$$

Note the thin space after the '!' in $n_1!$ and before n_2 starts. Also notice the quotation marks: it is not '!'. Similarly, for double quotes, always type "hello," not "hello". Note that punctuations such as colon, comma, and semicolon are placed *inside* the quotations. For fine points of typsetting, see the TEXbook [1].

1 Introduction

Our goal is to prove equality (1) given on page 1. Do not use hardwired numbers for any cross reference. Instead use the `\label{}`, `\ref{}` and `\pageref{}` commands.

1.1 Some tabular material

You can inline small tables in your document as follows:

Item	Price
Carrots	Rs 5
Peas	Rs 3

. This will look gross in general, so you should use the `table` environment to make a floating table, as shown in Table 1. Similarly, you can typeset figures using the `figure` environment.

Item	Price
Carrots	Rs 5
Peas	Rs 3

Table 1: Consumer price index.

*This is a homework to make you familiar with LaTeX typesetting. This document is derived from Professor Soumen Chakrabarti's previous offering of the course in CSE.

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1.2 More math

It is harder than equation (1) to typeset the following displayed equations, using the `eqnarray` environment:

$$\prod_{k\geq 0} \frac{1}{(1-q_k z)} = \sum_{n\geq 0} z^n \bigg/ \prod_{1\leq k\leq n} (1-q^k) \tag{2}$$

$$\begin{aligned}
\left(\int_{-\infty}^{\infty} e^{-x^2}\, dx\right)^2 &= \int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-(x^2+y^2)} dx\, dy \\
&= \int_0^{2\pi}\int_0^{\infty} e^{-r^2} r\, dr\, d\theta \\
&= \int\limits_0^{2\pi} \left(-\frac{e^{-r^2}}{2}\Bigg|_{r=0}^{r=\infty} \right) d\theta \\
&= \pi. \qquad (3)
\end{aligned}$$

Notice that in the second last line the limits of the integral look different. Also note the space between x and dx. Do not feel tempted to use *math italic* where you should be using *text italic*. Use the `\emph{}` command for this purpose. They are $different$ (which one was used in this case?).

Even vectors require some care to typeset: say $\vec{x} = (x_1, \ldots, x_d)$, not $\vec{x} = (x_1, ..., x_d)$ or $\vec{x} = (x_1, \cdots, x_d)$. You can get more fancy and say $(\overbrace{x_1, \ldots, x_d}^{d \text{ numbers}})$ if you need to. Arrays can be typeset inline, such as $\begin{pmatrix} x_{11} & x_{12} \\ x_{21} & x_{22} \end{pmatrix}$, or in a display as shown below.

$$A = \begin{pmatrix} a_{11} & a_{12} & \ldots & a_{1n} \\ a_{21} & a_{22} & \ldots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m1} & a_{m2} & \ldots & a_{mn} \end{pmatrix} \tag{4}$$

Arrays can also be used to typeset conditional formulae such as the following.

$$f(x) = \begin{cases} 1/3 & \text{if } 0 \leq x \leq 1; \\ 2/3 & \text{if } 3 \leq x \leq 4; \\ 0 & \text{elsewhere.} \end{cases} \tag{5}$$

1.3 Typesetting pseudocode using `tabbing`

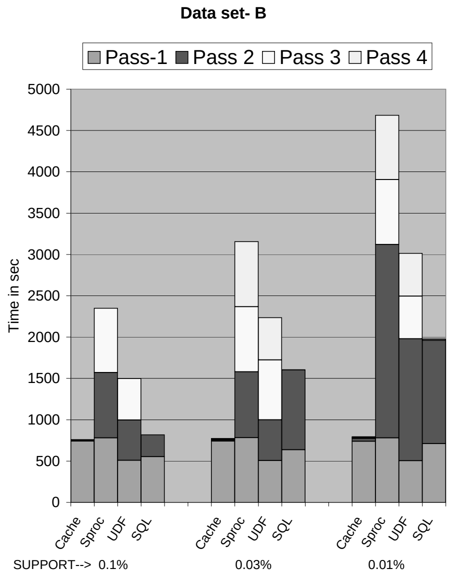
Use the `tabbing` environment to typeset the following in a box that is 0.8 times the width of the printable area. Notice the reduced font size (`\footnotesize`).

for $j := 2$ **step** 1 **until** n **do**
  begin[a] $accum := A[j]$; $k := j - 1$; $A[0] := accum$;
  while $A[k] > accum$ **do**
    begin $A[k+1] := A[k]$; $k := k - 1$;
    end
  $A[k+1] := accum$;
  end.

[a] Note the footnote in the `minipage` environment.

2 Including pictures

Use the `\includegraphics{}` command to include `.eps` files. These can be produced by a graph-drawing package such as Gnuplot or Excel:



3 Conclusion

It has been said that latex makes even bad writing appear professional. Well, that is just on the surface. The truth is soon revealed when you dig deeper. Good writing has no alternative and is an art that needs to be mastered with time and patience. I warmly recommend this classic by Strunk and White [2] for learning the golden principles of simplicity and brevity in technical writing.

References

[1] D. E. Knuth and A. Ego. *The TEXbook*. Addison-Wesley, 1996.

[2] W. Strunk and E. White. *The Elements of Style*. Macmillan publishing company, Inc., 1979.