

# Mathematical Writing Tips

- Mathematical writing is a means in which to communicate your mathematical ideas. Proper sentence structure and grammar are essential to effectively communicate your ideas. All projects will be evaluated according to the West Point Writing Standards (Substance, Organization, Style, and Correctness).
- Do not start a sentence with a symbol or a numeral. Either reword the sentence, or, for a numeral, spell out the number [1].
- Use numerals for all numbers over ten, and use numerals for zero through ten when they refer to exact measurements (*2 liters*, *1 hour*) [2].
- Italicize the variables that you use in your paper. This can be done when the written work is completed, and it will add a professional touch to your paper [1].
- Use correct, sophisticated terminology [1].

Incorrect: “Next, plug in 5 for  $x$ .”

Correct: “Next, substitute 5 for  $x$ .”

- Watch the use of pronouns. It is better to repeat a term than to replace the term with *it* or *they* if there is a chance that the reader will get confused [1].
- Don't be judgmental. Phrases like “It is easy to see that ...,” “It is clear that ...,” or “Simply ...” should not be used. Something obvious to the author may not be to the reader [1].
- Type mathematical expressions using some form of equation editor. Do not import Mathematica output.

Incorrect:

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In[1]:= Solve[3 x^2 + 5 x - 2 == 0, x]
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Out[1]= {{x -> -2}, {x -> 1/3}}
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Correct: Solving the quadratic equation

$$3x^2 + 5x - 2 = 0$$

produces the following roots

$$x = -2 \quad \text{and} \quad x = \frac{1}{3}$$

- Use headings and subheadings to divide your paper into different sections at logical junctures [1]. Refrain from using part 1 or part 2 as a heading, select an appropriate heading that summarizes the activities in that section, for example:

## Model Development

- Number all tables and figures and write a caption for each [1]. The Little, Brown Handbook 10<sup>th</sup> Ed. Has more examples on pages 121 - 123.

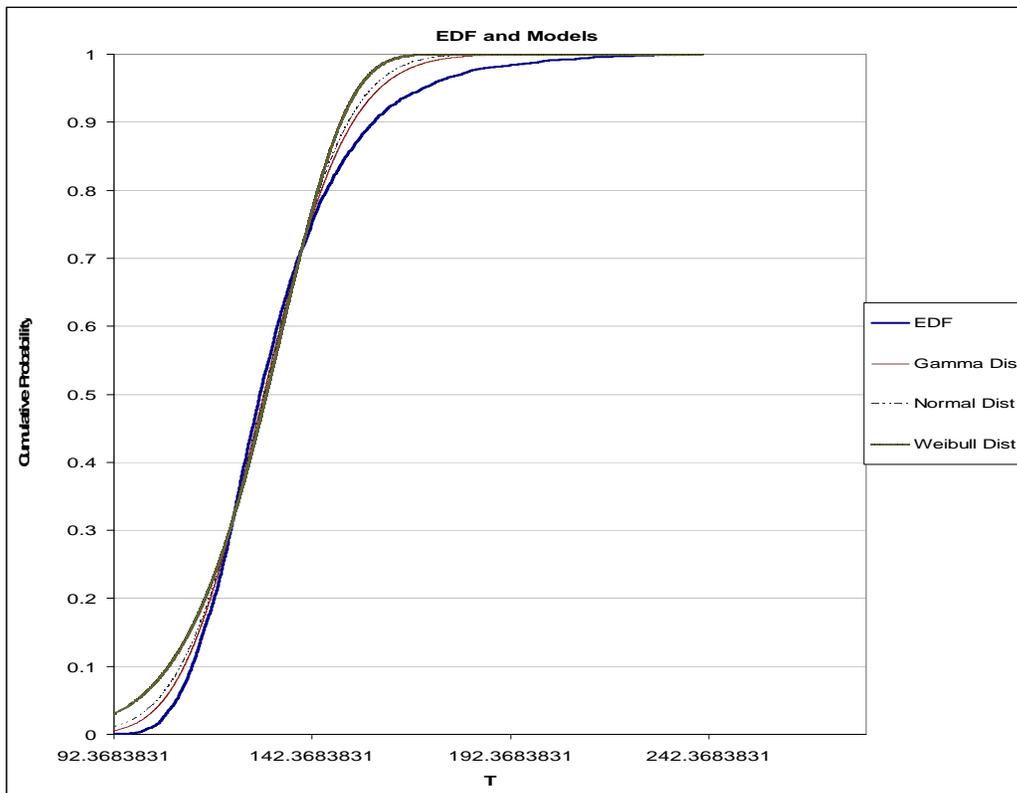
**Example Table** - A self-explanatory title falls above the table.

Table 4

Minimizing parameters and minimized SSE for each distribution taken from a project written by Galinas and Chafac

	Normal Model		Weibull Model		Gamma Model
$\mu$	130.3677	$\lambda$	0.007332	$\alpha$	61.93261
$\sigma$	16.48526	$\kappa$	8.996643	$\beta$	2.112954
SSE	7.365407	SSE	17.19948	SSE	4.619927

**Example Figure** – A self-explanatory title falls below the figure.



**Figure 1.** Graphical representation of the EDF and 3 Distributions taken from a project written by Galinas and Chafac.

- Algebraic Details – Given that the reader is reasonably sophisticated mathematically, you can leave out most of the mundane algebraic details. For example, it is perfectly acceptable to say, “The time at which the ball hits the ground is the positive root of the quadratic equation  $t^2 + 4t - 5 = 0$ , which is  $t = 1$ ,” or “Let  $f(x) = x^2e^x$ , whose derivative is  $f'(x) = (x^2 + 2x)e^x$ .” You need not show the calculations. In some cases, you might wish to provide a description of the technique used, such as, “Using the quadratic formula, we found that the roots were ...,” or, “After factoring and rearranging terms, we solved for  $x$  and  $y$  ...” In other cases, you may in fact need to include some algebra. If that is the case, think carefully about which steps are necessary to keep the reader on the right track. Do not merely copy the calculations you performed to come up with the answer [3].
- Connections – Each step in the argument should flow logically from the preceding step. To emphasize the connection between statements, you should freely use words such as *therefore*, *thus*, *so*, *hence*, *it follows that*, *consequently*, *from this*, and *so on*, where appropriate [3].
- Grammar and Punctuation – Remember that mathematical symbols are “words” and should be used with proper grammar and syntax. Use periods at the ends of sentences, even if the sentences end with mathematical symbols. Use commas, semicolons, colons, and dashes, where appropriate. Do not, however, use exclamation points unless you mean “factorial.”  
The equal sign (=) is a verb and should be used *only* be used between mathematical symbols. So you could ay, “let  $x = 2$ ,” but not, “The perimeter of a triangle = the sum of the lengths of the sides.” [3]
- Graded Homework Submissions – Graded Homework submissions may be typed or handwritten and specific requirements may vary from instructor to instructor. The following guidance applies to all. [3]
  - Be neat and logical in your presentation.
  - Number each problem and present them in order.
  - If your assignment submission has multiple pages, staple your assignment.
  - Include a title page and properly cite all references and assistance received.
  - Example:

**Problem:** Determine and classify the critical points of  $f(x) = x^3 - 3x$ .

**Solution:** Let  $f(x) = x^3 - 3x$ , whose derivative is  $f'(x) = 3x^2 - 3$

Upon setting  $f'(x) = 0$ , we find that the critical points are  $x = 1$  and  $x = -1$ .

The second derivative of  $f$  is  $f''(x) = 6x$ .

Since  $f''(1) = 6 > 0$ , then  $x = 1$  is a local minimum.

Conversely, since  $f''(-1) = -6 < 0$ , then  $x = -1$  is a local maximum.

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[1] Gerver, R. (2004). Writing Math Research Papers: A Guide for Students and Instructors. Emeryville, CA: Key Curriculum Press.

[2] Fowler, H. & Aaron, J. (2001). The Little, Brown Handbook. New York: Longman.

[3] Levine, A. (2000). Discovering Higher Mathematics: Four Habits of Highly Effective Mathematicians. San Diego, CA: Academic Press.