My First LaTeX Document

Michelle Krummel

April 25, 2015

1 Introduction

1.1 About Me

As a result of growing up in a military family, I have done a lot of traveling throughout my life. I lived in Germany for the majority of my childhood. Growing up in a foreign country was an amazing experience, one that taught me a great deal about cultural relativism. After high school, I joined the military for a short time, where I learned some very cool things, like rappelling off high towers. I've lived in many places including Hawaii, Virginia, Maryland, and North and South Carolina. I also spent a summer in Jordan, where I lived with a Muslim family and was immersed in their culture. Upon returning to the states, I earned my Bachelor's Degree in *Mathematics* from George Mason University, began teaching high school, and then went back to earn my Master's Degree in *Mathematics Education* from Towson University. I earned a second Master's Degree in *Educational Studies* with an emphasis on Gifted Education from Johns Hopkins University. Next year I will be entering my 15th year of teaching, a profession I have found personally rewarding. I thrive in an environment where I am challenged and allowed to be creative.

1.2 Interests & Hobbies

- **Photography** In addition to being a teacher, I am also a fine art photographer. The majority of my work is fine art portraiture, where I create surreal images using photomanipulation. I spend a lot of my free time working in Photoshop. I am especially interested in portraying levitation and dance, and would like to learn underwater photography in the future.

- **The Arts** Although I am highly left-brain dominant, I do have a passion for the arts. My favorite artists are Henri Matisse and Marc Chagall. One of the most enjoyable courses I took in college was an art class in which we spent the semester making art books. We not only created the insides of the books, but the bindings as well. We even learned how to make our own paper.

- **Web Design** I enjoy making web pages, and I especially enjoy working in HTML. Coding always seems so logical and orderly, yet there are endless possibilities for creative output.
- **Movies & Television** I have far too many favorites to name them all, so I will just list a few:
  - Science Fiction/Fantasy/Horror
    - Star Trek TOS (Yes, I am a Trekkie.)
    - A.I. Artificial Intelligence
    - Bates Motel
  - The Big Bang Theory (It gets its own category, because it is that awesome!)
  - Musicals & Dance-icals
    - Grease
    - Billy Eliot
    - My Fair Lady
  - Classics
    - Jane Eyre
    - Ethan Frome
    - Pride & Prejudice

1.3 Favorite Quotations

1. *Think! Think and wonder. Wonder and think. How much water can 55 elephants drink?* - Dr. Seuss
2. *In the Book of Life, the answers aren't in the back.* - Charlie Brown
3. *What lies behind us and what lies before us are tiny matters compared to what lies within us.* - Ralph Waldo Emerson
4. **Sheldon**: *Why are you crying?*
   Penny: *Because I'm stupid.*
   Sheldon: *That's no reason to cry. One cries because one is sad. For example, I cry because others are stupid, and that makes me sad.* - The Big Bang Theory

2 Mathematics

2.1 Mathematics and Me

I have always enjoyed doing mathematics. When I was younger, I thought of mathematics as a set of rules and procedures to be followed. As I dove deeper into my study of mathematics, however, I realized that it is so much more than that. Mathematics is full of mysteries to be solved. What is a mystery? I think of a mystery as an intriguing question with an unknown answer. Mathematicians pose questions about relationships, then set out to try to answer those questions. In school, we sometimes get so bogged down with the rules and procedures that we lose sight of the mystery. We must remember to "Think! Think and wonder. Wonder and think," (see quote above), which leads us to ask intriguing questions: "How much water can 55 elephants drink?"

2.2 Mathematical Notation

I will practice mathematical typsetting using the four-digit number 1972.

1. Superscripts, subscripts, and Greek letters
   (a) 19^{72}
   (b) $1^{9^{7^2}}$
   (c) 19_{72}
   (d) $1_{9_{7_2}}$
   (e) 1972π
   (f) $\cos\theta$
   (g) $\tan^{-1}(1.972)$
   (h) $\log_{19} 72$
   (i) $\ln 1972$
   (j) $e^{1.972}$
   (k) $0 < x \leq 1972$
   (l) $y \geq 1972$
2. Roots, fractions, and displaystyle
   (a) $\sqrt{1972}$
   (b) $\sqrt[19]{72}$
   (c) normal: $\frac{19}{72}$ displaystyle: $\displaystyle\frac{19}{72}$
   (d) normal: $\frac{1}{9+\frac{7}{2}}$ displaystyle: $\displaystyle\frac{1}{9+\frac{7}{2}}$
   (e) normal: $\sqrt{\frac{19}{72}}$ displaystyle: $\displaystyle\sqrt{\frac{19}{72}}$
3. Delimiters
   (a) display math mode:
   $$\left(1+\frac{9}{72}\right)$$
   (b) display math mode:
   $$\left|\frac{1}{9}-\frac{7}{2}\right|$$
4. Tables and equation arrays
   (a)

x	1	2	3	4
$f(x)$	1	9	7	2

   (b)

$$\begin{array}{rcl} 1+9-7*2 & = & x & (1)\\ 1+9-14 & = & x & (2)\\ 10-14 & = & x & (3)\\ x & = & -4 & (4)\end{array}$$

5. Functions & Formulas

(a) The quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(b) The function $f(x) = \left(x + \frac{1}{9}\right)^2 - \frac{7}{2}$ has domain $D_f : (-\infty, \infty)$ and range $R_f : \left[-\frac{7}{2}, \infty\right)$.

(c) Definition of a Derivative: $\lim\limits_{h \to 0} \frac{f(x+h) - f(x)}{h} = f'(x)$

(d) Chain Rule: $[f(g(x))]' = f'(g(x)) \cdot g'(x)$

(e) $\frac{d^2y}{dx^2} = f''(x)$

(f) $\int \sec^2 x \, dx = \tan x + C$

(g) $\int e^{2x} \, dx = \frac{1}{2}e^{2x} + C$

(h) Fundamental Theorem of Calculus, Part 1: $\int_a^b f'(x) \, dx = f(b) - f(a)$

(i) Fundamental Theorem of Calculus, Part 2: $\frac{d}{dx} \int_a^{g(x)} f(t) \, dt = f(g(x)) \cdot g'(x)$

(j) Euler's Method: $y_1 = y_0 + hF(x_0, y_0)$ where h is the step size, and $F(x, y) = \frac{dy}{dx}$

(k) $a_n = \left\{1972, \frac{1972}{2}, \frac{1972}{2^2}, \frac{1972}{2^3}, \cdots, \frac{1972}{2^n}\right\}$ represents a geometric sequence.

(l) $S_n = \sum_{n=1}^{\infty} \frac{1972}{2^n}$ is a convergent geometric series since $|r| = \left|\frac{1}{2}\right| < 1$.

(m) Taylor Series: $\sum_{n=0}^{\infty} \frac{f^{(n)}(c)}{n!}(x - c)^n$

(n) Velocity Vector: $\vec{v}(t) = x'(t)\,\vec{i} + y'(t)\,\vec{j} = \left\langle \frac{dx}{dt}, \frac{dy}{dt} \right\rangle$

(o) Area of Polar Curve: $A = \frac{1}{2} \int_{\alpha}^{\beta} r^2 \, d\theta$