First Homework (Part of Lab 1)

1. Type the examples in 2.4.1-2.4.5 (You can start with `simple.tex` that we made earlier).
2. Type the example in 2.11.1, and the first example in 2.11.3.
3. Type the two tables right before Section 2.12.
4. (Chapter 3) How would I typeset the following? Answer by showing the result of the typesetting (NOTE: You do NOT have to give the answer as (a), (b), (c), etc)

   (a) $\int_a^b f(x)\,dx = F(b) - F(a)$

   (b) $\lim_{n\to\infty} \sum_{i=1}^{n} f(x_i^*)\Delta x_i = \int_a^b f(x)\,dx$

   (c) $\lim_{\theta\to 0} \frac{\sin(\theta)}{\theta} = 1$

   (d) $y = e^{2^x}$

   (e) I $\heartsuit$ Math!

   (f) What's a "phantom"? Answer by giving an example.

5. Typeset the following:

   Let $y = f(x)$ be some function that is continuous on a closed interval, $[a, b]$. We wish to determine the length of the curve with represents the graph of f on $[a, b]$.

   We first subdivide the interval into n equal pieces whose endpoints we denote by: $a = x_0, x_1, x_2, \ldots, x_n = b$

   We can now approximate the length of the curve by adding the length of the line segments starting at $(x_{i-1}, f(x_{i-1}))$ and ending at $(x_i, f(x_i))$, for $i = 1, 2, \ldots, n$.

   By the Pythagorean Theorem, the length of the ith line segment is given by:

   $$L_i = \sqrt{(x_i - x_{i-1})^2 + (f(x_i) - f(x_{i-1}))^2}$$

   By the Mean Value Theorem, if f is differentiable on (a, b), then on the ith interval we can find x_i^* so that:

   $$f(x_i) - f(x_{i-1}) = f'(x_i^*)(x_i - x_{i-1})$$