Spring 2011 LaTeX Final

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Non-numbered Section

Theorem 0.1 (Pythagorean Theorem)**.**

$$a^2 + b^2 = c^2 \tag{1}$$

The Pythagorean Theorem (1) is the oldest theorem.

Lemma 0.2 (Zorn's Lemma)**.** *Suppose a partially ordered set has the property that every chain (i.e. totally ordered subset) has an upper bound. Then the set contains at least one maximal element [2].*

1 Numbered Section

Definition 1.1 (Union)**.**

$$A \cup B = \{x : x \in A \quad or \quad x \in B\} \tag{2}$$

Definition 1.2 (Intersection)**.**

$$A \cap B = \{x : x \in A \quad and \quad x \in B\} \tag{3}$$

Theorem 1.3 (De Morgan's Law)**.**

$$\neg(p \vee q) \iff (\neg p) \wedge (\neg q) \tag{4}$$

$$\neg(p \wedge q) \iff (\neg p) \vee (\neg q) \tag{5}$$

Item	Price
Banana	\$5.5
Potatoes	\$4.4
Apples	\$3.3
TOTAL	\$13.2

Table 1: Inventory

1.1 Alignment

Let $x \in \mathbb{C}$ and $i^2 = -1$. Then

$$\begin{aligned}
e^{ix} &= \sum_{n=0}^{\infty} \frac{(ix)^n}{n!} \\
&= 1 + ix + \frac{(ix)^2}{2} + \frac{(ix)^3}{3!} + \frac{(ix)^4}{4!} + \cdots \\
&= 1 + ix - \frac{x^2}{2} - i\frac{x^3}{3!} + \frac{x^4}{4!} + \cdots \\
&= \left(1 - \frac{(x)^2}{2} + \frac{x^4}{4!} - \cdots\right) + \left(ix - i\frac{x^3}{3!} + \cdots\right) \\
&= \left(1 - \frac{(x)^2}{2} + \frac{x^4}{4!} - \cdots\right) + i\left(x - \frac{x^3}{3!} + \cdots\right) \\
&= \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n)!} x^{2n} + i \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1} \\
&= \cos x + i \sin x
\end{aligned}$$

Thus

$$e^{ix} = \cos x + i \sin x$$

1.2 The Wronskian

$$W(f_1, \ldots, f_n)(x) = \begin{vmatrix} f_1(x) & f_2(x) & \cdots & f_n(x) \\ f_1'(x) & f_2'(x) & \cdots & f_n'(x) \\ \vdots & \vdots & \ddots & \vdots \\ f_1^{(n-1)}(x) & f_2^{(n-1)}(x) & \cdots & f_n^{(n-1)}(x) \end{vmatrix}, \qquad x \in I$$

2 Cantor set

References

[1] Christian Blanco and Brandon Eltiste. Latex decal, May 2011.

[2] Wikipedia. Zorn's lemma, May 2011.