An Elementary Proof of the Goldbach Conjecture

The Name of a Student Who Has Made it to Their Senior Project

1. Introduction

In which you explain your paper in broad terms.

2. Sufficient Background Information

In which you provide the reader with sufficient elementary knowledge and / or results to prepare him / her to understand your contribution to the field. An example of an align environment, with some spacing commands, follows:

$$
\begin{aligned}
x &\equiv a_1 \pmod{m_1} && (2.1)\\
&\equiv a_2 \pmod{m_2} && (2.2)\\
&\vdots \\
&\equiv a_r \pmod{m_r} && (2.3)
\end{aligned}
$$

3. Another Section

$$
\begin{aligned}
V_i &= v_i - q_i v_j, & X_i &= x_i - q_i x_j, & U_i &= u_i, & \text{for } i \neq j\,;\\
V_j &= v_j, & X_j &= x_j, & U_j u_j &+ \sum_{i \neq j} q_i u_i. && (3.1)
\end{aligned}
$$

By Equation (3.1) we can see how to refer, or not refer, to labeled equations.

Further, we want to show vertical spacing, with and without line breaks:
Next we want to illustrate that arrays are useful, and we can delineate the columns and rows of the array with vertical and horizontal lines, respectively:

	$\overline{0}$	$\overline{1}$	$\overline{2}$	$\overline{3}$
ψ_1	$\overline{0}$	$\overline{0}$	$\overline{0}$	$\overline{0}$
ψ_2	$\overline{0}$	$\overline{0}$	$\overline{2}$	$\overline{0}$
ψ_3	$\overline{0}$	$\overline{0}$	$\overline{0}$	$\overline{2}$
ψ_4	$\overline{0}$	$\overline{0}$	$\overline{2}$	$\overline{2}$

3.1. A Subsection if Necessary

These are useful when we want to elaborate on a subtopic of the current section, and our elaboration is sufficiently self-contained.

Lemma 3.1.1 *Let e be a positive integer.*
(i) Let $\overline{x} \in \mathbb{Z}_{2^e}$. Then there exist $i, k, m \in \mathbb{Z}$ with $0 \leq i \leq e$ such that $\overline{x} = \overline{2^i * 5^k * (-1)^m}$.
(ii) Let $i, j, k, \ell, m, n \in \mathbb{Z}$ such that $0 \leq i,\ j \leq e$. Then $\overline{2^i * 5^k * (-1)^m} = \overline{2^j * 5^\ell * (-1)^n}$ iff $i = j$ and $5^k * (-1)^m \equiv 5^\ell * (-1)^n \pmod{2^{e-1}}$.
(iii) If $e \geq 2$, then $\overline{5^k * (-1)^m} = \overline{5^\ell * (-1)^n}$ iff $m \equiv n \pmod 2$ and $k \equiv \ell \pmod{2^{e-2}}$.
(iv) If $e \geq 2$, then $(\overline{5})^{2^{e-2}} = \overline{1}$.

Lemma 3.1.2 *This lemma shows that footnoting[1] may be useful, except immediately after a variable name.*

Proof:

$$
\begin{aligned}
Ax &= b \\
\text{Therefore} \qquad x &= A^{-1}b
\end{aligned}
\tag{3.1.1}
$$

❏

Definition 3.1.3 *A definition, which is necessary for understanding or for proving Some Theorem.*

Theorem 3.1.4 *A theorem, which plays an integral role in your paper.*

[1] We place some comment that is relevant, but which if placed within the body of the paper would interrupt the flow more than if placed at the bottom of the page.

4. Another Section

Theorem 4.1 *$\overline{x} \in \mathbb{Z}_{p^e}$ is integrable if and only if $\overline{x} \in p\mathbb{Z}_{p^e}$.*

Proof: Let $\overline{x} \in \mathbb{Z}_{p^e}$ be integrable. Then, because of various previously proved or known theorems, we conclude that $\overline{x} \in p\mathbb{Z}_{p^e}$. Conversely, let $\overline{x} \in p\mathbb{Z}_{p^e}$ and note that because of some, possibly other, previously proved or known theorems, we arrive at the conclusion that $\overline{x} \in \mathbb{Z}_{p^e}$ is integrable. ❏

4.1. In Which We Illustrate How to Make Bold Math Mode in a Section Title: $\boldsymbol{X^n}$

And in which we show a multiple align environment, as follows:

$$\begin{aligned} a \cdot 0 &= a(0+0) && \text{by Lemma 3.1.2} \\ &= a \cdot 0 + a \cdot 0 && \text{by Theorem 3.1.4} \qquad (4.1.1) \end{aligned}$$

5. Recap and other opportunities

We have elaborated the original idea to a very fun and interesting topic. ❏

REFERENCES

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