Diagnosing "Bad" Mathematical Argument Writing

Goals

A mathematical text is an argument to a skeptical reader, not a dump of computations or symbols. Issues that tend to come up include:

- stating claims explicitly,
- choosing and using appropriate evidence (definitions, theorems, justified steps),
- writing for an intelligent but non-telepathic audience,
- addressing objections with precision and respect.

How to Use This Handout

Each passage below is intentionally flawed. Your task is to read each one as an **argument**: a claim that should be supported by appropriate mathematical evidence.

For your assigned passage:

1. Identify the **intended claim** (what is the writer trying to prove/show?).
2. Diagnose what goes wrong (be specific).
3. Propose **one concrete revision move** that would make it more convincing.

Discussion Prompts (Use for Any Example)

1. What is the claim? Is it stated clearly?
2. What mathematical support is missing (definition, theorem, justification, structure)?
3. Does the writer assume the reader can "fill in" too much?
4. Is there a single sentence that would most improve the passage?

Example M1

Consider the function $f(x) = x^2 - 4x + 3$. Taking the derivative gives $f'(x) = 2x - 4$. Setting this equal to zero yields $x = 2$. Evaluating the function at $x = 2$ gives $f(2) = -1$. Therefore, the derivative is zero at $x = 2$.

Example M2

Let A be a symmetric matrix. Then $A = A^T$. Hence,

$$x^T Ax = x^T A^T x = (Ax)^T x \geq 0.$$

Thus the result follows.

Example M3

Theorem. Continuous functions are important in mathematics.

Proof. Continuity is a useful property and appears in many theorems. Therefore, continuous functions are important.

Example M4

We claim that the sequence $a_n = \frac{1}{n}$ converges to zero. This is clear because the terms get smaller and smaller as n increases. Hence the sequence converges.

Example M5

It is obvious that the determinant must be zero in this case. Anyone familiar with linear algebra can see this immediately, so there is no need to explain further.