

Does good mathematical writing really make a difference?

We've now warmed up by reading some writing in a field in which you're probably more used to seeing written assignments. Let's take the lessons we've learned and apply them to writing in a *mathematical* context.

Consider each of the proofs below, each verifying that the sum of two odd numbers is an even number. With your partners, read through each proof and jot down some feedback for the proofs' authors: what have they done well? What have they done poorly? Do you *believe* each proof given? What grade would you assign to each proof? Why?

• **Proof 1.**

$$\rightarrow x = 2k + 1$$

$$\rightarrow y = 2k + 1$$

$$x + y = 2k + 1 + 2k + 1 = 4k + 2 = 2(2k + 1) = 2m$$

So we get $2m$, an even number, and we're done.

• **Proof 2.** $1 + 1 = 2$, $1 + 3 = 4$, $3 + 1 = 4$, $1 + 5 = 6$, $5 + 1 = 6$, $3 + 5 = 8$, $5 + 3 = 8$,...and so on. It's pretty clear that this pattern is always going to continue, so we can tell that an odd number plus another odd number is even.

• **Proof 3.** Recall that a number x is *odd* if it can be written as $2k + 1$ for some k , and it is even if it can be written as 2ℓ for some ℓ . We want to show that if x and y are both odd, then $x + y$ is even. So let's say x is odd and y is odd. That means there are numbers k and ℓ so that $x = 2k + 1$ and $y = 2\ell + 1$. Then

$$x + y = 2k + 1 + 2\ell + 1 = 2(k + \ell + 1).$$

If we say $m = k + \ell + 1$, this is $x + y = 2m$, so the sum is even number.