

Floating Point

Computing

Why $0.1 + 0.2$ is not 0.3 , and what to do about it.

Binary floating point cannot represent most decimal fractions exactly.

$$0.1 + 0.2 = 0.30000000000000000004$$

Why

Like $1/3$ in decimal — it repeats forever.

0.1 has no exact binary form

Comparing

Compare within a tolerance.

$$\text{abs}(a - b) < 1e-9$$

Money

Never a float.

Store integer pence, or a decimal type

THE COMMON MISTAKE

✗ **Rounding at the end of a long float calculation**

✓ **Using a decimal type throughout**

Errors accumulate at every operation, so a final round cannot recover the lost precision.

A 64-bit double has about 15–17 significant decimal digits. Beyond that, integers stop being exact too.