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Is 2in=1in+1in?

TeX's arithmetic forgets to round when dealing with units. For example, 1in is defined to be exactly 72.27pt. We can check that by writing `\dimen0=100in \the\dimen0` and getting 7227.0pt. So far, so good. But when we write `\dimen0=1in \the\dimen0`, we get 72.26999pt. Oops. This becomes worse since a number called 72.27pt actually exists, as witnessed by `\dimen0=72.27pt \the\dimen0` which gives us 72.27pt.

So we have the unfortunate situation that `1in` (which should be exactly 72.27pt) gives a number different from the number actually called `72.27pt`. This is because TeX truncates when working with the fractions representing exact units, but rounds when working with decimal fractions.

TeX calculates `1in` as

$$\left\lfloor 1 \times \frac{7227}{100} \times 2^{16} \right\rfloor 2^{-16}$$

namely truncating the fractional calculation rather than rounding it.

Other artifacts of TeX's fractional representation of units mean that $2in \neq 1in + 1in$: Indeed

```
\dimen0=1in \advance\dimen0 1in \the\dimen0 \dimen0=2in =\the\dimen0
```

leaves us with 144.53998pt=144.54pt.