

Example: Let  $x = \frac{5}{7} = 0.7142857143$

$$u = 0.71425$$

Computing with 5 digit arithmetic

$$fl(x) = 0.71429$$

$$fl(u) = 0.71425$$

Operation	Result	Actual value	Absolute error	Relative error
$x \oplus u$	$0.14285 \times 10^1$	$0.14285357143 \times 10^1$	$0.357142857 \times 10^{-6}$	$0.25 \times 10^{-4}$
$x \ominus u$	$0.4 \times 10^{-4}$	$0.3571428571 \times 10^{-4}$	$0.428571429 \times 10^{-5}$	0.12

↑ correct one sig.

cancellation error

Def: Cancellation occurs when 2 nearly equal numbers are being subtracted!

$$fl(x) = 0.d_1 d_2 \dots d_p \alpha_{p+1} \dots \alpha_k \times 10^n$$

$$fl(y) = 0.d_1 d_2 \dots d_p \beta_{p+1} \dots \beta_k \times 10^n$$

$$fl(fl(x) - fl(y)) = 0.\sigma_{p+1} \sigma_{p+2} \dots \sigma_k \times 10^{n-p}$$

$$\text{where } 0.\sigma_{p+1} \dots \sigma_k = 0.d_{p+1} \dots d_k - 0.\beta_{p+1} \dots \beta_k$$