

Note that **EQUALITIES** work only for **INTEGERS**

5.9.1

- not so much a problem with **for loop** as **index** typically **int**

- due to **uncertainty in final digit** of real (float, double) representation

float 7_{10} **0100 0000 1110 0000 0000 0000 0000 0000**

float 7_{10} **0100 0000 1110 0000 0000 0000 0000 0001**

Can represent 7.0000000 or:

$$\begin{aligned} & 4 * (1 + 0.5 + 0.25) \text{ or } 4 * (1 + 0.5 + 0.25 + 1 / 2^{23}) \\ & = 4 * (1 + 0.5 + 0.25 + 1 / 8388608) \\ & = 4 * (1 + 0.5 + 0.25 + 0.0000001192093) \\ & = 4 * (1.7500001192093) \\ & = 7.0000004768 \end{aligned}$$

(**nothing in between** with **float**)

So, depending upon on how calculations leading up to test value are done

- a test for (**double** or **float**) $x == 7$ (or 7.0) **might fail !!**

- **"might"** is unacceptable !!

Solution (as for **if** for same reason) :

- all comparisons done with **reals** MUST use:

$$\mathbf{fabs} (x - \text{sentinel_value}) < 0.0001$$

- why **fabs** ? Consider: $25 - 40 ==> -15$ which is < 0.0001