

Chapter 1 Mathematical Preliminaries

1.2 Roundoff Errors and Computer Arithmetic

1) Introduction. Computer arithmetic

In Calculus, given any number, we can find another number arbitrary close to the given number. In computers and calculators, however there is "distance" between the numbers.

Example: Consider a calculator which can compute with only 3 digits after the decimal point.

Then, the closest numbers to 1.333 are 1.334 and 1.332.

Suppose we are computing on a 3 decimal digits calculator

$$1.333 * 1.333 = 1.777$$

$$6 * 1.777 = 10.662$$

$$\text{Ans. } 10.662$$

Actual

$$1.333 * 1.333 = 1.776889$$

$$6 * 1.776889 = 10.661334$$

$$\text{Ans. } 10.661$$