When a measurement is made, the result should be quoted only to the accuracy that can be reliably assumed, in the context of the measurement instrument involved. The result is expressed as a number with a certain number of *digits* or *figures*. (E.g. 2.547 has 4 figures.) The last figure kept may be a result of an estimate, and may have an uncertainty associated with it. This figure is then considered *doubtful*; that is, it is not known to be completely accurate, but only approximately so. When keeping significant figures, obviously any figure beyond the first doubtful one is meaningless under usual circumstances, so all these should be dropped, and the last figure kept should be rounded. *In other words, the significant figures in a number include one doubtful or approximate figure.* Zeros are kept if they are significant, but dropped if not. If a zero is used merely to locate a decimal point, it is not significant, but if it actually represents a value read on the instrument, or estimated, it is significant. Often scientific notation can be used to determine significant figures. Examples of numbers and the significant figures they represent:

- 2.543 has four significant figures
- \(0.0002543 = 2.543 \times 10^{-4}\) has four significant figures. The zeros are placeholders.
- 2.543000 has seven significant figures. The zeros are meaningful here.

During the computation itself, it doesn’t matter terribly much if the non-significant figures are kept or dropped, as typically the difference will only result in a change of the doubtful figure of the final result. However, in the end result, only significant figures should be retained, and all doubtful figures beyond the first one should be dropped. Retaining too many figures implies an accuracy greater than the figures actually represent. *Note: Portable calculators sometimes give many excess figures, some of which are not significant.* Don’t treat the calculator as infallible, and don’t think that all figures a calculator gives are significant. The following rules may be used for the retention of significant figures in a computation:

1. In addition and subtraction, all columns beyond the first column that contains a doubtful figure may be dropped. This means that all figures lying to the right of the last column in which all figures are significant should be dropped.

2. In multiplication and division, retain in the result only as many significant figures as the least precise number involved.

If the first figure dropped is less than 5, the figure before it should be left as is. If the first figure dropped is 5 or greater, the figure just before it should be rounded up (increased by 1). Note – some conventions differ slightly on the rules for rounding, but we will use this convention. Remember, rounding only makes a difference in the doubtful figure that is not known so precisely anyway. Please refer to the textbook for a more detailed discussion on this subject.