Product Foundation Training: Math

**Number Representation**

(Self-paced Study Guide)

# Access the Learning Material

Download the “Math – Number Representation (self-paced).zip” file from the [training materials](https://mathworks.sharepoint.com/:f:/s/edg/training_program/EhTz7SKNIpBMv900El-I1oYBgfwefNdgLZdVCjdE1hPUlA?e=eksHYq). Unzip the file to a folder. Make sure that you have write access to that folder. Add this folder and all subfolders to MATLAB Path.

Learning material hierarchy:

Root Folder

Topic Folder

Exercises Folder

Demo Folder

Slide File

Data Folder

Workbook File

Solution Live Script

# Self-paced Learning Roadmap

## General guideline

This section defines the main roadmap that the trainee should follow to complete the self-paced training. The trainee must treat the list of learning objectives for each topic as the ultimate guide, which are given at the beginning of each slide.

Using the roadmap:

1. Work through one topic at a time
2. Refer to the slide material (Locate the slide using the hierarchy)
3. Work through the demos and activities (Locate the files using the hierarchy)
4. Review the key takeaway

## Roadmap

* Topic: **Computer Number Representation**
  + Demos:
    - (Slide 12) Run bin2dec or dec2bin for converting between decimal and binary
    - (Slide 17) Run intmax and/or intmin for a couple of the datatypes (like uint64)
    - (Slide 28) Run tstb.utils.ieee754bits(…) on a couple of different values and discuss how they are represented. Good examples are 1, 2, .75, pi, realmax, realmin, eps(0), Inf, NaN.
  + Activities: Refer to the slide
  + Key takeaway:
    - Representation of integers in binary.
    - How to convert binary to decimal.
    - Representing signed integers is not straight-forward.
    - int8 and int16 are pretty limited in their range, int32 can cover up to about a billion, and int64 is huge.
    - Double precision gives about 16 decimal places of accuracy regardless of the magnitude of the number.
    - Floating point datatypes can also represent certain non-numeric values (Inf, NaN).
    - Sparse and complex matrices are other types of matrices to be aware of.