IV. Map Scale, Spatial Resolution, and Spatial Data Accuracy

A. Map scale is an indicator of map accuracy
   1. The smaller the scale, in general, the lesser the accuracy, and vice versa
      a. e.g. map accuracy at 1:100,000 scale is much less than 1:24,000 scale

B. Locations Accuracy and Topological Accuracy in GIS
   1. Location Accuracy - measures the error in the absolute position of a map point or feature relative to real world, georeference coordinates.
   2. Topological Accuracy - a measure of the error in topology and attribute features of map features

C. USGS Map Standards for Accuracy
   1. USGS maps are tested and standardized so that there is no more than 10% of total position points can be more than 0.02 inches (0.5 mm) out of position at the prevailing map scale.

In Class Exercise

At a scale of 1:65,000, 0.02 inches on the map represents how much distance on the ground in meters? Show all of your work.

\[
\frac{0.02}{65,000} = \frac{300\text{ in on the ground}}{x} = 2.54 = \frac{3002\text{ cm}}{\text{.01}}
\]

Given a scale of 1:24,000, 30 m error on the ground would represent how many millimeters of error on the map? Show all of your work.

\[
\frac{30}{24,000} = \frac{0.0125\text{ m error on map}}{x} = \frac{1.25\text{ mm error}}{\text{.01}}
\]

Given a scale of 1:24,000 and a spatial feature resolution of 10 m, how many inches of resolution does this represent in map units? Show all of your work.

\[
10\text{ m} = \frac{0.0004167\text{ m on the map}}{x} = 0.04167\text{ cm} \times 2.54 = \frac{1.063\text{ in}}{\text{.01}}
\]