Announcements

- First day of TAM 211 only class!
- Cumulative exam this week (Thursday-Saturday)

Upcoming deadlines:
- Monday (4/1–TODAY!): PrairieLearn HW9/11
Goals and Objectives

• Understand the concepts of center of gravity, center of mass, and centroid.
• Be able to determine the location of these points for a body.
Center of Gravity and Centroid
Center of gravity

To design the structure for supporting a water tank, we will need to know the weight of the tank and water as well as the locations where the resultant forces representing these distributed loads act.

How can we determine these resultant weights and their lines of action?
Center of gravity
Center of gravity
<table>
<thead>
<tr>
<th>Center of Mass</th>
<th>Center of Volume</th>
<th>Center of Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\overline{x} = \frac{\int x , dm}{\int dm}$</td>
<td>$\overline{x} = \frac{\int x , dV}{\int dV}$</td>
<td>$\overline{x} = \frac{\int x , dA}{\int dA}$</td>
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<tr>
<td>$\overline{y} = \frac{\int y , dm}{\int dm}$</td>
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Centroid

The centroid, C, is a point defining the geometric center of an object.

The centroid coincides with the center of mass or the center of gravity only if the material of the body is homogeneous (density or specific weight is constant throughout the body).

If an object has an axis of symmetry, then the centroid of object lies on that axis.

In some cases, the centroid may not be located on the object.
Locate the centroid of the area.
Locate the centroid of the area.