**Problem statement** An alien spaceship is found. A major part of the spaceship is a thin metal bar which is 120 meters long (metric aliens) with a cross-section of 1 square centimeter. The bar is heavy and has varying density. A metallurgist samples of the bar at 20 meter intervals, and finds the density of the samples (in grams per cubic centimeter).

<table>
<thead>
<tr>
<th>Meter mark</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>30.4</td>
</tr>
</tbody>
</table>
| 20         | ...      | Data lost. (Stolen by aliens?)
| 40         | 46.5     |
| 60         | 65.8     |
| 80         | 29.2     |
| 100        | 52.1     |
| 120        | ...      | Lunch break.|

Estimate the total weight of the alien object. Is it likely that one person could lift it?

**Problem statement** a) Suppose \( f(x) \) is defined on \( 0 \leq x \leq 1 \) by the following rule:

\[
 f(x) \text{ is the first digit in the decimal expansion for } x.
\]

For example, \( f(1/2) = 5 \) and \( f(0.719) = 7 \). Sketch the graph of \( y = f(x) \) on the unit interval with appropriate scales for \( x \) and for \( y \). Use a graphical interpretation of the definite integral to compute \( \int_0^1 f(x) \, dx \).

c) Suppose the function \( g(x) \) is defined as follows:

\[
 g(x) \text{ is the second digit in the decimal expansion for } x.
\]

For example, \( g(0.437) = 3 \). Compute \( \int_0^1 g(x) \, dx \). Again, a graph may help.

**Problem statement** a) Graph \( f(x) = 2 - |x| \) in the interval \(-1 \leq x \leq 3 \). Compute \( \int_{-1}^{3} f(x) \, dx \).

b) Graph \( g(x) = 2 - |x| \) in the interval \(-1 \leq x \leq 3 \). Compute \( \int_{-1}^{3} g(x) \, dx \).

c) Graph \( h(x) = |2 - x| \) in the interval \(-1 \leq x \leq 3 \). Compute \( \int_{-1}^{3} h(x) \, dx \).

**Problem statement** a) There are values of the constants \( A \) and \( B \) so that the derivative of \( Axe^x + Be^x \) is \( xe^x \). Find these values.

b) Compute \( \int_{1}^{2} xe^x \, dx \).

Happy Thanksgiving!