5. [12 points] For each of the following, write down the CAPITAL LETTER for the **ONE** best answer for your submission. You do not need to show work, but it is strongly suggested that you try to solve the problem from start to finish before selecting your answer.

a. [4 points] A container in the shape of a cube with side length ℓ meters is resting with one face on the ground. It is filled 1/3 of the way with a liquid of constant density 2000 kg/m^3. Recall the gravitational constant is $g = 9.8\text{m/s}^2$. How much work in joules is required to pump all the liquid to the top of the container?

(**A**) $\displaystyle\int_0^{\frac{1}{3}\ell} 2000g(\ell - h)h^2 \, d\ell$

(**B**) $\displaystyle\int_0^{\frac{1}{3}\ell} 2000g(\ell - h)\ell^2 \, dh$

(**C**) $\displaystyle\int_{\frac{1}{3}\ell}^{\ell} 2000g(\ell - h)h^2 \, dh$

(**D**) $\displaystyle\int_{\frac{1}{3}\ell}^{\ell} 2000g(\ell - h)\ell^2 \, d\ell$

(**E**) None of the above.

b. [4 points] Suppose $p(x)$ is a probability density function for x, the total weight of avocados, **in millions of pounds**, eaten in the United States on a given day. The equation $p(1) = 0.5$ can be best interpreted as: "On any given day,...

(**A**)...there is a 50% chance that 1 million pounds of avocados will be eaten in the United States."

(**B**) ...there is roughly 100% chance that between 0 and 2 million pounds of avocados will be eaten in the United States."

(**C**) ...there is approximately a 10% chance that between 900,000 and 1,100,000 pounds of avocados will be eaten in the United States."

(**D**) ...the median weight of avocados eaten in the United States is 1 million pounds."

(**E**) None of the above.

c. [4 points] Consider the series

$$\sum_{n=1}^{\infty} a_n = 0 - \frac{1}{2} + 0 - \frac{1}{4} + 0 - \frac{1}{6} + 0 - \frac{1}{8} + ...$$

which is the infinite sum of the terms in the sequence defined by

$$a_n = \begin{cases} 0 & \text{for } n \text{ odd.} \\ -\frac{1}{n} & \text{for } n \text{ even.} \end{cases}$$

The series $\displaystyle\sum_{n=1}^{\infty} a_n$...

(**A**) ...converges by the alternating series test.

(**B**) ...converges because it converges absolutely.

(**C**) ...converges by the ratio test.

(**D**) ...converges because $\lim_{n\to\infty} a_n = 0$.

(**E**) None of the above.