5. [10 points] Flora pours herself a cup of juice in a cup with the following shape. The cup is filled to the top.

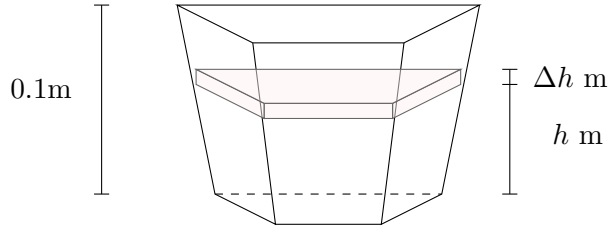

Figure 5.1: Cup

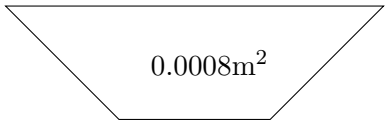

Figure 5.2: Top of cup

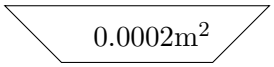

Figure 5.3: Bottom of cup

The area of a horizontal cross section of the cup (as shown in Figure 5.1) is **linear** with respect to h, its height above **the bottom of the cup.**
Flora is going to drink the juice with a magical straw. The top of the straw is always 0.05m above **the top of the cup**. Because the straw is magical, it extends automatically and the bottom end of the straw is always at the surface of the juice. The density of the juice is 1100kg/m^3. The gravitational acceleration is $g = 9.8\text{m/s}^2$.

a. [5 points] What is the approximate mass of the slice of juice that is h meters above **the bottom of the cup**, of thickness Δh meters (as shaded in Figure 5.1)? Do not simplify your answer. Include units.

b. [3 points] What is the approximate work needed to lift the same slice of juice (h meters above **the bottom of the cup**, of thickness Δh meters, as shaded in Figure 5.1) to a height of 0.05m above **the top of the cup**? Do not simplify your answer. Include units.

c. [2 points] Write an expression involving integrals for the total work needed to lift all the juice to a height of 0.05m above **the top of the cup**. Do not evaluate any integrals in your expression. Include units.