

Math 20C – Swanson – Winter 2021  
Homework 9  
Due Sunday, 3/14/21 at 11:59pm

- The graded part of the homework is on WebAssign.
- The problems below are also assigned and you are responsible for doing them, but they will not be collected or graded.

1. Consider the rectangle  $R = [1, 3] \times [4, 5]$  in the  $xy$  plane. A 3D object  $E$  lies above the rectangle  $R$  and below  $z = y + 2$ . The units for  $x, y, z$  are cm. Include units in your answers. The density at  $(x, y, z)$  is  $\rho(x, y, z) = e^x \text{ g/cm}^3$ .

- (a) Compute the volume of  $E$  using

$$\text{Volume} = \iint_R ((z \text{ at top}) - (z \text{ at bottom})) dA.$$

- (b) Compute the mass of  $E$  using

$$\text{Mass} = \iiint_E \rho(x, y, z) dV = \iint_D \int_{z \text{ at bottom}}^{z \text{ at top}} \rho(x, y, z) dz dA = \dots .$$

- (c) Compute the average density of  $E$ :

$$\text{Average of } \rho(x, y, z) \text{ over } E = \frac{\text{Mass of } E}{\text{Volume of } E}$$