**5.** [5 points] Let $p(x)$ be the probability density function for the price of a meal on South University Avenue where x is given in dollars. The formula of $p(x)$ is given as follow:

$$p(x) = \frac{1}{\sqrt{\pi}} e^{-(x-9)^2}$$

a. [2 points] Write, but do **not** evaluate, an integral that gives the probability of a meal on South University Avenue being between \$8 and \$14.

b. [3 points] Write, but do **not** simplify, an expression that estimates your integral in (a) by MID(3). Be sure to write out all the terms in your sum.

6. [8 points] Ari and Bell are enjoying their time at a beach.

a. [5 points] Ari has an ice cream cone of radius 0.1m and height 0.3m, as shown in the following picture. The cone is filled to the top with ice cream, and the ice cream located a vertical distance h meters above the bottom tip of the cone (the point at the bottom of the figure below) has density $\delta(h) = \ln(2 - h)$ kg / m^3. An example of the vertical distance h is shown in the figure below.
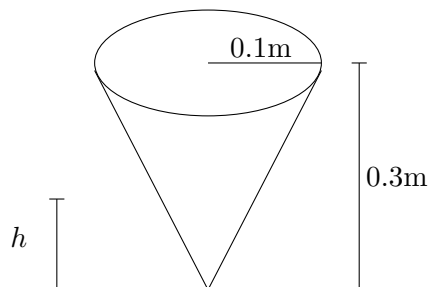
Write, but do **not** compute, one or more integral(s) to express the total mass of the ice cream cone. Include units.

b. [3 points] Bell is lifting a bottle of water straight upwards 3 meters at a constant speed. The bottle initially has a mass of 2kg, and it is leaking at a steady rate of 0.5 kg / m. Assume that gravitational acceleration is $g = 9.8$ m / s^2. Write, but do **not** compute, one or more integral(s) to express the total work done by Bell on the bottle. Include units.