

2. [9 points] A group of scientists is modeling the transmission of light through different liquids. The functions below measure the brightness of the light, in lumens, at a depth of  $d$  cm below the surface of two different liquids: A and B.

$$A(d) = 45e^{-.001d}$$

$$B(d) = 50e^{-0.001(2d-25)}$$

The functions  $A(d)$  and  $B(d)$  have a domain of  $[0, \infty)$ .

- a. [1 point] How bright is the light at the surface of liquid B? *Express your answer in exact form, or rounded to at least two decimal places.*

\_\_\_\_\_ lumens

- b. [4 points] At what depth do the lights in the experiments with liquids A and B have the same brightness? *Show all work. Express your answer in exact form, or rounded to at least two decimal places.*

\_\_\_\_\_ cm

- c. [4 points] In a third experiment the scientists observe that the brightness of a light decreases by 10% for every 5 cm of depth below the surface of a liquid C. No matter the starting depth, how much deeper do you need to go to reduce the brightness by 25%? *Show all work. Express your answer in exact form, or rounded to at least two decimal places.*

\_\_\_\_\_ cm