4. [8 points] In a small town, property values close to the school are determined primarily by how far the land is from the school. The function \( \delta(r) = \frac{1}{ar^2 + 1} \) gives the value of the land (in thousands of dollars per \( \text{m}^2 \)), where \( r \) is the distance (in meters) from the school and \( a \) is a positive constant.

a. [5 points] Find a formula containing a definite integral that computes the value of the land that lies in the annulus of inner radius 100 m and outer radius 200 m (figure shown below).

![Diagram of an annulus with inner radius 100 m and outer radius 200 m]

b. [3 points] Calculate the exact value of the land that lies in the annulus of inner radius 100 m and outer radius 200 m. Your answer should contain \( a \). Show all your work.