

8. [13 points] Two smokestacks  $d$  miles apart deposit soot on the ground between them. The concentration of the combined soot deposits on the line joining them, at a distance  $x$  from one stack, is given by

$$S = \frac{c}{x^2} + \frac{k}{(d-x)^2}$$

where  $c$  and  $k$  are positive constants which depend on the quantity of smoke each stack is emitting. If  $k = 27c$ , find the  $x$ -value of the point on the line joining the stacks where the concentration of the deposit is a minimum. Justify that the point you found is actually a global minimum.