

20. Let the distance in question be  $x$ . The path difference (between rays originating from  $S_1$  and  $S_2$  and arriving at points on the  $x > 0$  axis) is

$$\sqrt{d^2 + x^2} - x = \left(m + \frac{1}{2}\right) \lambda ,$$

where we are requiring destructive interference (half-integer wavelength phase differences) and  $m = 0, 1, 2, \dots$ . After some algebraic steps, we solve for the distance in terms of  $m$ :

$$x = \frac{d^2}{(2m+1)\lambda} - \frac{(2m+1)\lambda}{4} .$$

To obtain the largest value of  $x$ , we set  $m = 0$ :

$$x_0 = \frac{d^2}{\lambda} - \frac{\lambda}{4} = \frac{(3.00\lambda)^2}{\lambda} - \frac{\lambda}{4} = 8.75\lambda .$$