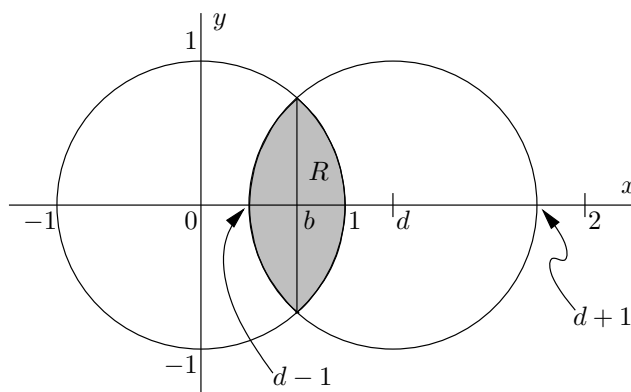


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Math 152:18 Calculus II  
Workshop #5 Problem 5  
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*Problem 5:* Find to four place accuracy the number  $d$  so that if the center of two circles of radius 1 are at distance  $d$ , the area common to the two circles is half of the area of either circle.

*Hint:* We first sketch the two circles. For simplicity, we center the first circle on the origin, and place the second circle on the  $x$ -axis at a distance of  $d$ . This means that the second circle is centered at  $(d, 0)$ .



The region common to both areas is shaded in the figure. We wish to express the area  $A$  of that region as a function of  $d$ . Note that by symmetry  $A$  is 4 times the area of the region labeled  $R$ . It may be easier to calculate the area of  $R$  than that of the shaded region.

Also note that the entire figure is symmetric about the line  $x = b$ . This implies that  $b$  is halfway between the two centers of the circles. Thus,  $b = d/2$ .