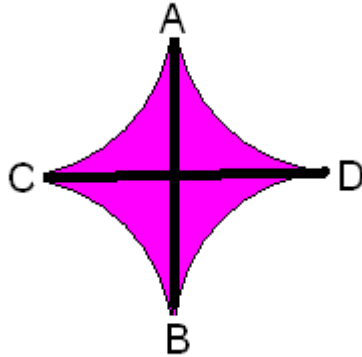


## Huddle 2007

1. Line segments  $AB$  and  $CD$  each have length 2, are perpendicular, and bisect each other. Each of the four arcs is an arc of a circle which is tangent to the two line segments. Find the area of the shaded region.



2. The harmonic mean of the positive numbers  $a, b$  is defined by the expression  $HM(a, b) = \frac{1}{\frac{1}{2}(\frac{1}{a} + \frac{1}{b})}$ . If  $a + b = 1$ , what is the greatest possible value of  $a + HM(a, b)$ ?

3. Evaluate  $\sqrt{6 + \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}}$ .

4. The object of a Sudoku is to fill in the remaining squares so that each of the numbers 1,2,3,4,5 appears in each row, each column, and each of the five regions enclosed in heavy lines. When you solve the Sudoku below, what number goes in the box marked  $X$ ?

1				3
X				
	5		1	
5			4	