

## Problem 20

A unit square is rotated  $45^\circ$  about its center. What is the area of the region swept out by the interior of the square?

- (A)  $1 - \frac{\sqrt{2}}{2} + \frac{\pi}{4}$     (B)  $\frac{1}{2} + \frac{\pi}{4}$     ©  $2 - \sqrt{2} + \frac{\pi}{4}$   
(D)  $\frac{\sqrt{2}}{2} + \frac{\pi}{4}$     (E)  $1 + \frac{\sqrt{2}}{4} + \frac{\pi}{8}$

Problem 23

In  $\triangle ABC$ ,  $AB = 86$  and  $AC = 97$ . A circle with center  $A$  and radius  $AB$  intersects  $\overrightarrow{BC}$  at points  $B$  and  $X$ . Moreover  $\overrightarrow{BX}$  and  $\overrightarrow{CX}$  have integer lengths. What is  $\overrightarrow{BC}$ ?

- (A) 11  
(B) 28  
© 33  
(D) 61  
(E) 72  
13b

Problem 16

In triangle  $ABC$ , medians  $AD$  and  $CE$  intersect at  $P$ .  $PE = 1.5$ .  $PD = 2$  and  $DE = 2.5$  What is the area of  $AEDC$ ?

- (A) 13  
(B) 13.5  
© 14  
(D) 14.5  
(E) 15