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Geometry In-Class Exam 1
 Math 330B/539 (Barsamian)
 Friday, January 30, 2009
No Calculators

Problem:	1	2	3	4	5	Total
Score:						
Possible:	50	50	50	50	50	250

[1] (problem 4.1#7, done in class)

In triangle(ABC), point D is the midpoint of side(AB) and point E is the midpoint of side(AC).

(a) Using similarity, prove the Triangle Midsegment Theorem:

$$\text{segment}(BC) \parallel \text{segment}(DE) \text{ and } BC = 2DE.$$

(b) Medians BE and CD meet at point F. Using similarity, prove that $BF = 2FE$ and $CF = 2FD$.

[2] (suggested problem 4.2#2)

In triangle(ABC), angle C is a right angle. D is a point on side(BC) such that ray(AD) bisects angle(A). Which segment is longer: BD or CD? Prove your answer.

[3] (part of assigned problem 4.3#5)

A hexagon #1 has sides 1 unit long. A hexagon #2 is inscribed by joining the midpoints of the sides of the first hexagon. What is ratio $\text{area}(\text{hexagon \#1}) / \text{area}(\text{hexagon \#2})$. Show your work and explain.

[4] (suggested problem 4.4#1)

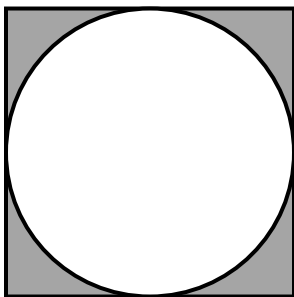
In triangle(ABC), $m(\text{angle}(A)) = 36$, and $m(\text{angle}(B)) = m(\text{angle}(C)) = 72$. Prove that the ratio of lengths BA/BC is equal to ϕ , the golden ratio.

Hints:

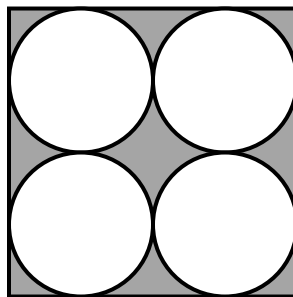
- Let $BC = 1$. Then your job is to show that BA is equal to ϕ .
- Let D be a point on AB such that ray(CD) bisects angle(C). Use similarity and side splitting.

[5] (suggested problem 4.5#3)

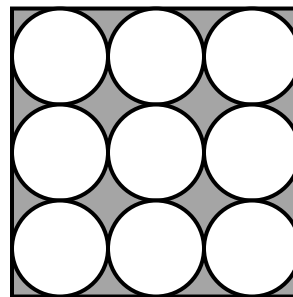
In each picture, the square has sides of length 1. Find the shaded areas. Show your work clearly.



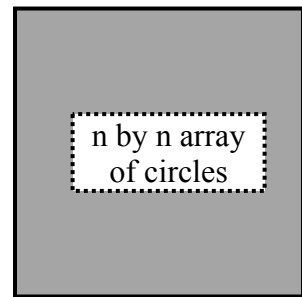
picture (a)



picture (b)



picture (c)



picture (d)