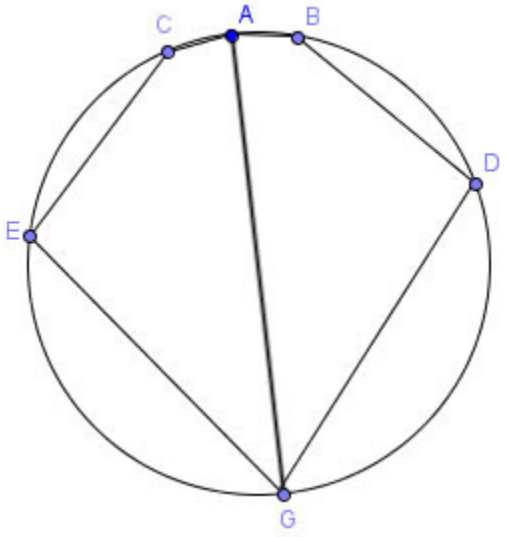
Name:

Math 490, Spring 2013: Homework #7
Due Thursday, March 21, 2013

1a. Is quadrilateral $ABDG$ cyclic? Explain your answer.



b. In the figure above (which is not necessarily to scale) $AB = AC = 2$, $BD = CE = 7$ and $DG = EG = 11$. $\overline{AG}$ is the circle's diameter. Find the area of quadrilateral $ABDG$. You must show your work.

2a. Is a parallelogram with side lengths 10 and 5 cyclic? Why or why not?

b. Draw a parallelogram with side lengths 10 and 5. Is your answer unique? Prove it.

3a. Give an example of a quadrilateral that is NOT cyclic.

b. Find the area of the quadrilateral you drew.

c. Can you use Brahmagupta's formula to find the area of the quadrilateral? Why or why not? Justify your answer.

4. Hexagon $ABCDEF$ has five sides of length 27 (that is, $AB = BC = CD = DE = EF = 27$) and one side, $\overline{AF}$, of length $10\frac{1}{3}$ ($AF = 10\frac{1}{3}$); the hexagon is inscribed in a circle. What is the sum of the lengths of the three diagonals that can be drawn from F? Justify your answer and show details.

5a. Write something you learned about π from preparing your Pi Day presentation.

b. Write something you learned about π from your classmates' Pi Day presentations.

6a. Use GeoGebra to illustrate a regular $n-$ gon inscribed in a circle of radius 1. You need a slider that will handle n such that $3 \leq n \leq 1024$. Print for your homework the images for $n = 10$ and $n = 16$.

b. Use GeoGebra to illustrate a regular $n-$ gon circumscribed about a circle of radius 1. As in part (a), you need a slider that will handle n such that $3 \leq n \leq 1024$. Print for your homework the images for $n = 10$ and $n = 16$.

c. Use your work in parts (a) and (b) to fill in the following table (give answers accurate to 10 decimal places).

n	**Area of regular $n-$ gon inscribed in circle of radius 1**	**Area of regular $n-$ gon circumscribed about circle of radius 1**
10		
50		
96		
100		
250		
300		
350		
1000		

d. Use the table above to estimate π. What is the *smallest* value of n (in your table) that gives π accurate to 1 decimal place? Explain your reasoning.

e. What is the *smallest* value of n (in your table) that gives π accurate to two decimal places? Explain your reasoning.

f. Modify your GeoGebra work to determine the *smallest* value of n (if your table in part (c) were extended) that would give π accurate to three decimal places. Explain your reasoning.

g. Repeat part (f) to get π accurate to four decimal places.

h. Repeat part (f) to get π accurate to *as many* decimal places as you can using GeoGebra.