Name: _____ **Quiz 9: Polar Integration**

MAT 296 **Spring 2015**

Formulae: Recall the formula you ***certainly*** already have memorized for the final:

$$A = \frac{1}{2}\int_a^b r(\theta)^2\, d\theta$$

and this formula

$$\cos^2\theta = \frac{1+\cos 2\theta}{2}$$

Problem 1: Find the area of the region inside the circle $r = 2\cos\theta$ but outside the circle $r = 1$. [You should draw the picture of these curves first.]

Bonus 1 What is the sum of the following series: $\sum_{n=1}^{\infty} \frac{1}{n^2}$

Bonus 2 What is the name of the following series: $\sum_{n=1}^{\infty} \frac{1}{n}$

Bonus 3 Does the following series diverge or converge? Why? [Hint: What grows faster—polynomials or logs?]

$$\sum \frac{1}{\ln(\ln(\ln(n)))}$$