Undergraduate Problem Solving Competition
Problem 4 - Polygon Catastrophe

Due Jan. 30, 2018

In ancient Greek times, the pentagram was a revered mathematical symbol. It was even worn as a badge for individuals to identify each other as members of a mathematical "Society of Pythagoras".[1] For this problem, you will prove your worthiness to join Pythagoras' group by constructing a regular pentagon (related to the pentagram) on a blank sheet of paper using only a straight edge and compass.

The pentagon is a special polygon because it requires knowledge and utilization of the golden ratio, ϕ, to draw proportionally.
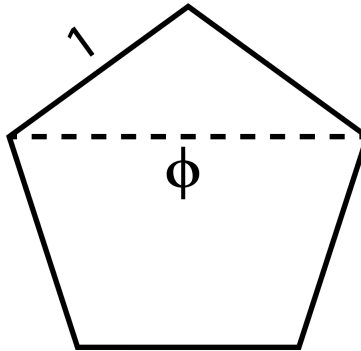

Figure 1: Regular pentagon with side length 1

To receive full points on this problem, first, craft a line segment of length $\phi = \dfrac{\sqrt{5}+1}{2}$.
Then on a different area of the paper, craft the pentagon itself. Priority points will be based on how clearly your thought process and reasoning is recorded in your solution.
Compasses may be borrowed from the front desk of the math tutoring center (where problems are submitted).

In the spirit of UPSC, you should not use the internet or look up the solution in a book. Please include your **name, student ID number, and email address** on your solution. Submit answers at the front desk of the T. Benny Rushing Mathematics Center.

[1]The Divine Proportion, by H. E. Huntley. p.28