MATH 1953 Written Homework 2 (due Wednesday, April 15th at the BEGINNING of class!)

Please write solutions to these problems on separate sheet(s) of paper (i.e. don't print and write on this assignment.)

(For this entire assignment, using a polar graphing tool to get a sense for what's going on will be helpful. A great free one is Desmos, which is usable online at www.desmos.com.)

1. When we graphed $r = \sin(2\theta)$ in class, we ended up with a flower shape with four "petals."

(a) What does the graph of $r = \sin(6\theta)$ look like, i.e. how many "petals" will it have and why? (Hint: break up $[0, 2\pi]$ into intervals where $\sin(6\theta)$ is positive and negative.)

(b) What does the graph of $r = \sin(7\theta)$ look like, i.e. how many "petals" will it have and why? (Hint: break up $[0, 2\pi]$ into intervals where $\sin(7\theta)$ is positive and negative.)

(c) If n is an integer, what's the area of a single "petal" for the general graph $r = \sin(n\theta)$? What is the total area inside all "petals" of the curve $r = \sin(n\theta)$? (Hint: you'll need to make a guess about how many "petals" $r = \sin(n\theta)$ has based on parts (a) and (b); you don't have to justify this guess.)

2. What about the more complicated $r = C + \sin(6\theta)$ for a positive number C? Will it give you a flower shape for every C? If not, what about C controls whether you still get a flower, and why?