In class assignment 9 - Taylor Series

Name:_____

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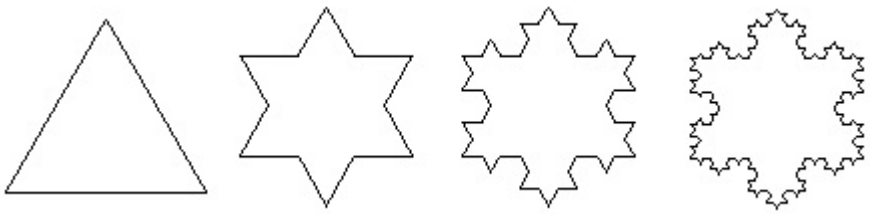
Directions: Work in groups to complete the following problems.

1. To construct the Koch snowflake, start with an equilateral triangle with sides of length 1. Step 1 in the construction is to divide each side into three equal parts, construct an equilateral triangle on the middle part, and then delete the middle part (see picture). Step to is to repeat step 1 for each side of the resulting polygon. This process is repeated at each succeeding step. The Koch snowflake curve is the curve that results from repeating this process indefinitely.

   (a) Let s_n, l_n, and p_n represent the number of sides, the length of a side, and the total length of the nth approximating curve (the curve obtained after step n in the construction), respectively. Find formulas for s_n, l_n, and p_n.

   (b) Show that $\lim_{n\to\infty} p_n = \infty$

   (c) Sum an infinite series to find the area enclosed by the snowflake curve.



2. Suppose that $f(x) = \sum_{n=0}^{\infty} c_n x^n$ for all x.

   (a) If f is an odd function, show that $c_0 = c_2 = c_4 = \cdots = 0$

   (b) If f is an even function, show that $c_1 = c_3 = c_5 = \cdots = 0$

3. Find the terms up to degree 4 for the Maclauin series for $\sin^2(x)$. Find the terms up to degree 4 for the Maclauin series for $\cos^2(x)$. Add them. Do you get what you expect?

4. Find the Maclaurin series for $\cosh(x)$.

5. If $f(x) = \sin(x^3)$ find $f^{(15)}(0)$.