1. Find the Taylor series for $f(x) = \ln(x)$ when $a = 1$.
   (a) Demonstrate how to do this by *brute force*, taking the derivatives of $\ln(x)$ at $x = 1$.
   (b) Demonstrate how to do this starting with the relationship of $f(x) = \dfrac{1}{1-x}$ and a simple converging geometric series.

2. If $f(x)$ is an odd function then $\int_{-a}^{a} f(x)\,dx = 0$.
   (a) Draw a graph and explain why.
   (b) Use the algebraic definition of an odd function to explain why. [Hint: Consider $G(x) = \int_0^x f(t)\,dt$]

3. Assume the power series

$$p(x) = x - 4x^3 + 16x^5 - 64x^7 + 256x^9 + \ldots$$

   is a Maclaurin series for some function $f(x)$. Write an equation (a simple expression) for $f(x)$.

4. Reconsider the *Snuggly Circle Problem* using this idea:

   A third circle (C_3) can snuggly fit in the space between C_2 and the lower left hand corner of the square. Continue fitting in a sequence of circles, C_k. Use this sequence to determine the radius of C_2.

1. Find the Taylor series for $f(x) = \ln(x)$ when $a = 1$.

   (a) Demonstrate how to do this by *brute force*, taking the derivatives of $\ln(x)$ at $x = 1$.

   (b) Demonstrate how to do this starting with the relationship of $f(x) = \dfrac{1}{1-x}$ and a simple converging geometric series.

2. If $f(x)$ is an odd function then $\displaystyle\int_{-a}^{a} f(x)\,dx = 0$.

   (a) Draw a graph and explain why.

   (b) Use the algebraic definition of an odd function to explain why. [Hint: Consider $G(x) = \displaystyle\int_0^x f(t)\,dt$]

3. Assume the power series

$$p(x) = x - 4x^3 + 16x^5 - 64x^7 + 256x^9 + \ldots$$

   is a Maclaurin series for some function $f(x)$. Write an equation (a simple expression) for $f(x)$.

4. Reconsider the *Snuggly Circle Problem* using this idea:

   A third circle (C_3) can snuggly fit in the space between C_2 and the lower left hand corner of the square. Continue fitting in a sequence of circles, C_k. Use this sequence to determine the radius of C_2.