Recall that a Taylor series for $f(x)$ at $x = a$ is given by $C_0 + C_1(x - a) + C_2(x - a)^2 + C_3(x - a)^3 + \cdots$ where $C_n = \frac{f^{(n)}(a)}{n!}$.

1. Let $f(x) = \arctan(x)$. What is the derivative $f'(x)$?

2. Use the geometric series to get the series for $f'(x)$ at $x = 0$.

3. Integrate your series term-by-term to get a series for $\arctan(x)$ at $x = 0$. Check that the constant term is correct by plugging in $x = 0$.

4. What is the interval of convergence of the series for $\arctan(x)$?

5. Plot on the same graph both $f(x)$ and the 9th degree Taylor polynomial for $f$.

6. Plug in $x = 1$ to find the Leibniz series formula for $\pi$. 