1. Find the radius of convergence of \( \sum_{n=0}^{\infty} \frac{(2n)!}{n!(n+1)!} x^n \). For extra credit, find the interval of convergence (this is not easy). For extra extra credit, find the exact value of the series (also not easy).

2. If \( f(x) = x^x \), then we showed in Math 105 that \( f'(x) = x^x (1 + \ln x) \). Find the first three terms of the Taylor series of \( f(x) \) at the point \( a = 1 \). For extra credit, show that the formula I gave you for \( f'(x) \) is correct.