Exercise 1 (Bessel Function)**.** Consider the series $\sum_{n=1}^{\infty} \frac{(-1)^n}{2^{2n}(n!)^2}$, this is $J_0(1)$ where J is called the Bessel J function. Do the following:

i) From the convergence tests we've seen in class name a test that proves that the series converges.
ii) State the conditions needed to verify the validity of the test.
iii) Apply the test to prove that $J_0(1)$ converges.

1. It is possible to use either Dirichlet's Alternating Series test or the Ratio test.