

Maclaurin Series for $\cos x$ and $\sin x$.

1. Find the first 5 derivatives of $\cos x$ and $\sin x$. Evaluate them at $x = 0$
2. Use 1) to find the pattern for the n th derivative of $\cos x$ and $\sin x$ at $x = 0$.
3. Use 2) to find the Maclaurin Series for $\cos x$ and $\sin x$.

4. Find the radius of convergence for the Maclaurin Series of $\cos x$ and $\sin x$.

5. Show that $e^{ix} = \cos x + i \sin x$ using the Maclaurin series for them. Remember $i = \sqrt{-1}$, so $i^2 = -1$.

6. Use 5) to show that $e^{i\pi} = -1$