Find domain of convergence for series $a_n = \frac{\sin(in)}{(z+i)^n}$.

Solution: Use root test

$$\lim_{n\to\infty} \sqrt[n]{a_n} = \lim_{n\to\infty} \sqrt[n]{\frac{\sin(in)}{(z+i)^n}} = \frac{1}{|z+i|} < 1$$

So $|z+i| > 1$.

Answer: The domain of convergence for this series is circle $|z+i| > 1$.