MAT454 Notes

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Let's, as we usually do, consider a holomorphic function $f(z)$ in an open set $\Omega \subseteq \mathbb{C}$. Last time, we showed that f has a convergent power series expansion in any open disc in Ω (centered at the center of the disc). For example, around $a = 0 \in \Omega$, we can write

$$f(z) = \sum_{n=0}^{\infty} a_n z^n$$

Writing $z = re^{i\theta}$, we get

$$f(re^{i\theta}) = \sum_{n=0}^{\infty} a_n r^n e^{in\theta}$$

We can write out the following formula for these Fourier coefficients:

$$a_n r^n = \frac{1}{2\pi} \int_0^{2\pi} e^{-in\theta} f(re^{i\theta}) d\theta$$

Today we're going to be looking at the consequences of this formula.