MTH101:   Tutorial 4

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October 11, 2017

Exercise 1.1

Let γ_R be the Circle with radius R, center $c = -\frac{3}{2}$ with counterclockwise orientation.
Compute the integral

$$I = \oint_{\gamma_R} \frac{2z^2 - iz + \sqrt{3}}{(z+3)(2z-3)} dz,$$

with radius $R_1 = 1$ and $2 < R_2 < 3$.

Exercise 1.2

Compute the Integral

$$\oint_\gamma \frac{\cos^2 z}{(e^z - 1)(z - \pi i)} dz,$$

where γ is counterclockwise $|z - \pi i| = 2$.

Exercise 1.3

Compute the Integral

$$I = \oint_\gamma \frac{\sinh z}{z^2(z + 2 - 3i)} dz,$$

where γ is $(x - 1)^2 + y^2 = 4$ clockwise(!).

Exercise 1.4

*Integrate the given function around the triangle with vertices i,
$\pm 1 - i$ counterclockwise.*

$$(\cos 3z)/(6z).$$

Exercise 2.1

Determine whether the following series is convergent or divergent, choose appropriate test and justify your answer.

(1)

$$\sum_{n=0}^{\infty} \frac{(20+30i)^n}{n!}$$

(2)

$$\sum_{n=0}^{\infty} \frac{n+i}{3n^2+2i}$$

(3)

$$\sum_{n=0}^{\infty} \frac{n-i}{3n+2i}$$

Exercise 2.2

Find the center and the radius of convergence.

$$\sum_{n=0}^{\infty} \frac{(z - 2i)^n}{n^n}$$