University of Boumerdes
Faculty of science
Physics' Department

Université de Boumerdes
University of Boumerdes

Fcts of a Complex Variable
L2 – Physics
4th Semester 2023/2024

Functions of a Complex Variable
Complex Integrals 1

Contour integrals
Exercise 1
Evaluate the integral

$$\int_{\mathcal{C}} \mathrm{Re}(z)\, dz$$

for the following contours $\mathcal{C}$ from -4 to 4:

a. The line segments from -4 to $-4 - 4i$ to $4 - 4i$ to 4;
b. the lower half of the circle with radius 4, center 0;
c. the upper half of the circle with radius 4, center 0.
d. What conclusions (if any) can you draw about the function $f(z) = \mathrm{Re}(z)$ from this?

Cauchy Integral Formula
Exercise 2
Evaluate

$$\int_{\mathcal{C}} \frac{\sin z}{(z \div 1)^7}\, dz$$

where, $\mathcal{C}$ is the circle of radius 5, center 0, positively oriented.

Cauchy Integral Theorem
Exercise 3
Apply Cauchy Integral Theorem to show that

$$\int_{\mathcal{C}} \frac{z^3}{z^2 \div 5z \div 6}\, dz = 0$$

when C is the unit circle $|z| = 1$, in either direction.

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