Complex Analysis

Math 312 Spring 1998 — MWF 10:30am - 11:25am
Buckmire — Fowler 112

Class 24 **(Wednesday March 25)**

SUMMARY Understanding Contour Integration
CURRENT READING Brown & Curchill pages 123-125
NEXT READING Brown & Curchill pages 125-129

Update on *Class 22* and *Class 23*
After growing comfortable with evaluating contour integrals using the parametrization method (i.e. using $z(t)$) we introduced more higher-level tools such as the Cauchy-Goursat Theorem, the Path Independence Theorem and the Deformation Invariance Theorem.
GROUPWORK
Write down, in your own words, a sentence describing each one of the following theorems. You may also want to write down symbols, pictures or even integrals which help you to understand these theorems.

Cauchy-Goursat Theorem

Path Independence Theorem

Deformation Invariance Theorem

Examples

Consider the following integrals of the function $f(z) = \dfrac{1}{z^3 + z}$

$A = \oint_{C_1} f(z)\,dz$, $B = \oint_{C_2} f(z)\,dz$, $C = \oint_{C_3} f(z)\,dz$ and $D = \oint_{C_4} f(z)\,dz$

The contours C_1, C_2, C_3 and C_4 are as sketched below:

Which of the following equations are true? Give reasons for your answers.

1. $A = B$?

2. $B = C$?

3. $C = D$?

4. $D = A$?

Exercise

Using partial fractions, we can write $\dfrac{1}{z^3 + z} = \dfrac{P}{z + i} + \dfrac{Q}{z - i} + \dfrac{R}{z}$

Find P, Q and R

Evaluate A, B, C and D