RUTGERS
UNIVERSITY | NEWARK

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Complex variables

Fall 2016

Homework exercises #8

Problem 1.

(1) Recall the definition of the complex trigonometric functions and all their properties (stated in your lecture notes).

(2) Prove all the properties.

(3) Do the same for the complex hyperbolic functions.

Problem 2. Consider the principal logarithm function $\mathrm{Log}\colon \Omega \to \mathbb{C}$.

(1) Recall the domain of definition Ω.

(2) Is it true that $\mathrm{Log}(z_1\, z_2) = \mathrm{Log}(z_1) + \mathrm{Log}(z_2)$ for any z_1 and z_2 in Ω?

Problem 3.

(1) Recall the definition of z^α for two complex numbers z and α.

(2) According to your definition, is it true that $z^2 = z \cdot z$ for every complex number z?

(3) According to your definition, is it true that $(z^a)^b = (z^b)^a = z^{ab}$ for any complex numbers z, a and b? Try $z = e^{3i\pi/4}$, $a = 2$ and $b = i$.

Additional exercises

Here are additional exercises from the textbook. Unlike before, these exercises are not optional: you should definitely work on them.

> 3.1, 3.5, 3.7, 3.9

> 3.30, 3.31, 3.32, 3.33, 3.37, 3.39

> 3.40, 3.41, 3.45

> 3.46, 3.48, 3.50

> If you have extra time: 3.36, 3.38, 3.51, 3.52, 3.53, 3.54