Dr. Z.'s Intro to Complex Variables Homework assignment 20

Due: April 16, 2020, 1:00pm. Please email (either scanned handwriting, or .txt, or .pdf) to

DrZcomplex at gmail dot com

with an attachment called

hw20FirstNameLastName.txt [or hw20FirstNameLastName.pdf]

and Subject: hw20

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1. Use the argument principle to find the number of solutions of the equation

$$-3z + e^{3z} = 6 \quad,$$

in the left half-plane $\{z \,:\, Re\,z < 0\}$.

2. Determine how many zeros of the function

$$f(z) = z^4 - 2z - 2 \quad,$$

lie in the annulus $\frac{1}{2} < |z| < \frac{3}{2}$.

3. State Rouché's theorem, and, using the argument principle, prove it.

4. State the Fundamental Theorem of Algebra, and using Rouché's theorem prove it.