

Test 2

Name: _____

Show your work! Answers that do not have a justification will receive no credit.

1. (25 points) Compute the following:

(a) $\log(5 - 5i)$

(b) 4^i

(c) $(2 + 3i)^2$

(d) All solutions to $e^{2z} + e^z - 2 = 0$.

(e) The derivative of $\frac{e^z}{z^2 + 1}$

2. (25 points) (a) State the Cauchy Riemann equations

(b) State the definition of complex analytic

(c) Derive the Cauchy Riemann equations from the definition of complex analytic.

3. (15 points) Let $f(z)$ be analytic in a domain D and assume $\operatorname{Re} f$ is constant. Then show f is constant.

4. (15 points) If f is an analytic function, then show that the imaginary part of f is harmonic.

5. (15 points) Find the harmonic conjugate to $u = x^3 - 3xy^2 + 2y$.

6. (5 points) Graph $|2iZ - 4| = 6$.