

Andrej Cherkaev's Math 3160 Midterm exams given Spring 2000.

Problem 1.

Simplify, write the result in algebraic and in exponential forms:

$$\frac{(1 + \sqrt{3})^3}{25 \frac{3 - 4i}{3 + 4i} + |12 + 5i|}$$

Problem 2.

Solve the equation, write the result in algebraic and in exponential forms (25 points):

$$z^3 = -27; \quad z = ?$$

Problem 3.

Compute, write the result in the algebraic form (25 points):

$$a) \quad e^{2+i\frac{\pi}{4}}$$

Problem 4.

Check if $u(x, y)$ could be a real part of an analytical function $f(x + iy) = u(x, y) + iv(x, y)$.

If it could be a real part of an analytical function, find the imaginary part of that function.

$$a. \quad u = \sqrt{x^2 + y^2}$$

$$b. \quad v = \ln(x^2 + y^2)$$

Bonus Problem.

Solve the equation:

$$z^4 + 3iz^2 + 4 = 0$$