

(September 24, 2014)

Complex analysis midterm 01

Paul Garrett garrett@math.umn.edu <http://www.math.umn.edu/~garrett/>

Please write on one side of a page, with your name on every page.

Please restate the respective questions, and respond in complete sentences, in standard English, legibly. The goal is *explanation* and also *persuasion*, not crypticness or telegraphic-ness.

Responses should be intelligible *without* definitive prior expertise. That is, the message(s) should be intelligible without knowing the message(s) in advance.

[01.1] Determine all values of $\left(\frac{1+i}{\sqrt{2}}\right)^i$.

[01.2] Determine the Laurent expansion of $f(z) = 1/(1+z^2)^3$ in the annulus $1 < |z|$.

[01.3] Compute $\int_0^\infty \frac{x dx}{x^4 + 1}$.

[01.4] Compute $\int_{-\infty}^\infty \frac{e^{itx} dx}{x^2 + 1}$ with real t .

[01.5] Compute $\frac{1}{1^2 + 1} + \frac{1}{2^2 + 1} + \frac{1}{3^2 + 1} + \dots$
