

Physics 3513, Homework #9 (due 11/29)

The numbers in parentheses after the problem number indicate points for each problem.

P1(10) (Boas 1.21) Find the real and imaginary parts $u(x, y)$ and $v(x, y)$ of $f(z) = e^{iz}$

P2(10) (Boas 3.2a) Evaluate $\int_0^{1+i} (z^2 - z) dz$ along the line $y = x$

P3(20) (Boas 4.5) Find the first few terms of each of the Laurent series about the origin (one series for each annular ring between singular points), and calculate $\operatorname{Res}_{z=0} f(z)$ for

$$f(z) = \frac{z - 1}{z^3(z - 2)}$$

P4(10) (Boas 6.6) By finding the Laurent series, calculate $\operatorname{Res}_{z=0} \sin \frac{1}{z}$

P5(10) (Boas 6.24) Find $\operatorname{Res}_{z=0} \frac{1 - \cos 2z}{z^3}$

P6(20) (Boas 7.4) Evaluate $\int_0^{2\pi} \frac{\sin^2 \theta d\theta}{5 + 3 \cos \theta}$

P7(20) (Boas 7.30a) Evaluate $\int_0^\infty \frac{dx}{1 + x^4}$