Math 428 – Midterm 2 Study Topics

Section 4.5: Inverse mapping theorem (where does inverse exist, find derivatives of inverse).

Section 5.1: Compute residues of functions given by quotients $\dfrac{f(z)}{g(z)}$ using long division, or division of power series using geometric expansions, whichever you prefer.

Section 5.2: Calculate the integral over $[0, 2\pi]$ of a rational function of trig functions. Calculate integrals over $\mathbb{R}$ of rational functions, and rational functions multiplied by $e^{\pm it}$ (and similarly $\sin t$ or $\cos t$).

Section 5.3: Fourier transforms $\hat{f}(s)$ are a special case of evaluating integrals over $\mathbb{R}$ like those in Section 5.2. Recognize when you need to complete the contour to upper half-space versus lower half-space depending on the sign of s.

Section 6.1: Know the basic examples of conformal maps between infinite strips, upper (or right) half space, quadrants, and discs. Be able to compose them to get more examples.