Problem Set 5 (§4.1.4–4.2.3) Math 660

Due Monday, July 25, 2011 Jim Fowler

Midterm Reminder

Midterm 1 is scheduled for Friday, July 22, 2011. The best way to prepare for the midterm is to do more homework problems.

And ask yourself: **are you doing the homework?** If not, you are *in big trouble!* I can only point you in the direction you should travel: you must make the journey yourself.

Problem 1

Page 120, problem 3 in Ahlfors' *Complex Analysis*.

Problem 2

Let M be the Riemann surface for $w = (z(z-1)^2)^{\frac{1}{3}}$ obtained by taking three copies of the Riemann sphere, each with the slit $[0,1]$ deleted, and identifying appropriate sides of the slits. For $0 \leq \ell \leq 2$ let P_ℓ be the point of M where $z = 2$ and $w = 2^{\frac{1}{3}} e^{\frac{2\ell\pi\sqrt{-1}}{3}}$. Let C_ℓ be the closed curve in M which starts with P_ℓ, goes around $z = 1$ one and a quarter times (*i.e.,* $2\pi + \frac{\pi}{2}$ radians) to $z = 1 + \sqrt{-1}$, goes from $z = 1 + \sqrt{-1}$ in a straight line to $z = \sqrt{-1}$, goes around $z = 0$ one and a half times (*i.e.,* 3π radians) to $z = -\sqrt{-1}$, goes in a straight to $z = 1 - \sqrt{-1}$, goes around $z = 1$ a quarter times (*i.e.,* $\frac{\pi}{2}$ radians) back to P_ℓ.

Evaluate the integrals, and compute the dimension.

Problem 3

Page 120, problem 2 in Ahlfors' *Complex Analysis*.

Problem 4

Page 123, problem 2 in Ahlfors' *Complex Analysis*.

Problem 5

Page 123, problem 1 in Ahlfors' *Complex Analysis*.