Math 4200
Fri Sept 9

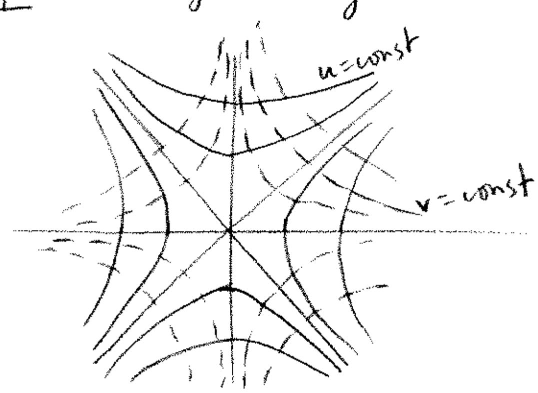
* pages 3-5 Wed notes

HW for 1/16

§1.5 25, 26, 27, 28
§1.6 1c, 2abc, 3a, 4, 6, 10, 14
§2.1 2ac, 3, 5, 10, 11, 13, 14

Interesting geometric fact: the level curves of harmonic conjugates are always $\perp$. There are 2 good explanations of this fact:

<u>example</u> $f(z) = z^2$
$u = x^2 - y^2 \quad v = 2xy$



Differentiation of basic functions

$e^z \sim \frac{d}{dz} e^z = e^z$ (Hw)

$\cos z$

$\sin z$

$\cosh z$

$\sinh z$

$\tan z$

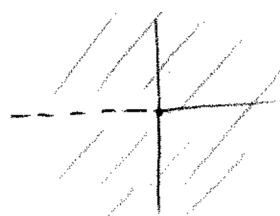
etc.

$\log z = \ln|z| + i \arg z$

principal branch

$-\pi < \arg z < \pi$

(could use other branches)



$\frac{d}{dz} \log z = \frac{1}{z}$

give 2 proofs : (a) Inv fcn thm

(b) CR.

$z^a := e^{a \log z}$

$\Rightarrow z^{1/n} = ?$

$a^z := e^{z \log a}$

there are subtle questions related to finding branches of fcns, e.g. $\sqrt{z^2-1}$ (in book)

$\sin^{-1}(z)$, $\cos^{-1}(z)$ (in Hw)