Assignment 12

Find real part / imaginary part of the functions, as applicable.
① – ④. Try to plot using the software (as for ⑥ – ⑪).

① Real $\rightarrow \dfrac{\sinh 2x}{\cosh 2x + \cos 2y}$

② Imaginary $\rightarrow \dfrac{\sinh 2y}{\cos 2x + \cosh 2y}$

③ Real $\rightarrow \frac{1}{2}\tan^{-1}\dfrac{2x}{1-x^2-y^2}$

④ Imaginary $\rightarrow \log\left[\sqrt{1+\sin\theta} - \sqrt{\sin\theta}\right]$

⑤ Prove that $\psi = \log\left[(x-1)^2 + (y-2)^2\right]$ is harmonic in every region which does not include the point $(1,2)$. Find a function ϕ such that $\phi + i\psi$ is an analytic function of the complex variable $z = x+iy$. Try to plot using a software (as for ⑥ – ⑪).

⑥ Discuss the transformations, if any, in detail, both sides. Try to plot using a software, and include various types of plots in the submission. Softcopy may include color plots, while hardcopy may include grey scale printed plots.

⑥ $w = z+c$, $w = cz$, $w = 1/z$

⑦ Bilinear Transformation $w = \dfrac{az+b}{cz+d}$, $ad-bc \neq 0$

⑧ $w = z^2$

⑨ Joukowski's transformation $w = z + 1/z$.

⑩ $\sin(A+iB)$, $\cos(\theta + i\phi)$, $\tan(A+iB)$

⑪ $\sinh(x+iy)$, $\cosh(x+iy)$, $\tanh(x+iy)$

G-1 – ①	G-6 – ⑤
G-2 – ⑧	G-7 – ⑥
G-3 – ②	G-8 – ⑨
G-4 – ③	G-9 – ⑪
G-5 – ④	G-10 – ⑩
	G-11 – ⑦

Submit by 20-9-2012.