EXAM mathematical methods in physics
January 28 (afternoon session), 2014

Potential theory

Locate and name the singularities of

$$f(z) = \frac{\ln(z-2)}{(z^2+4)^2}\,.$$

Define the singularities and the function in more detail if necessary and give the residues for the singularities where this is appropriate. You can stop calculating when only numbers appear in your result. You do not have to make final simplifications.

QUESTION 2

Prove that the region in the z-plane, $x > 0$ and $0 < y < a$ is mapped under

$$w = \cosh\frac{\pi z}{a}$$

to the upper half plane. Show first why the broken line of the border can go to a straight line $w \in \mathbb{R}$. Show also where the images of the points $z = 0$, $z = \mathrm{i}a$ and $z = \infty$ are found in the w plane.