DECAYS IN QFT - WS 2012/2013

Sheet 5 **30/11/2012**

Exercise 1: $f : \mathbb{R} \to \mathbb{C}$ (10 points = 5+5)

Consider the function $f : \mathbb{R} \to \mathbb{C}$

$$f(x) = \sqrt{x^2 - 4m^2} \ln \left[\frac{\sqrt{x^2 - 4m^2} + x}{\sqrt{x^2 - 4m^2} - x} \right] , \tag{1}$$

whereas m is a real number.

1. Determine and plot Re$[f(x]$.
2. Determine and plot Im$[f(x]$.

Exercise 2: $f : M \to \mathbb{C}$ (10 points)

The complex function

$$f(z) = \sqrt{z(z-1)} , \tag{2}$$

where $z \in \mathbb{C}$, is a multivalued function defined on the manifold M. Study $f(z)$. In particular, determine the manifold M and which is the value of the function on the different sheets. Discuss also the different possibilities for the branch cut.