Problem 4.1

0.0/6.0 points (ungraded)

a) Consider a regular branch $\varphi(z) = \sqrt[3]{z}$ with a branchcut $z \in [0, i\infty]$ (see fig.1(a)).
The regular branch is defined by the condition $\varphi(-1) = e^{i\pi/3}$.

Find $\varphi(1)$, $\varphi(i+0)$ and $\varphi(i-0)$.

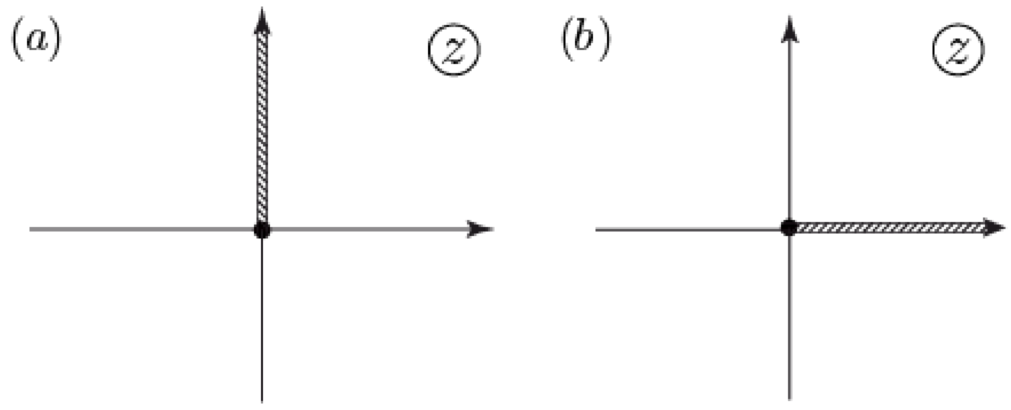

Fig. 1.

a.1)
Use i for complex unity, sqrt(#) for $\sqrt{\#}$ and e^(#) for the exponential function. Present the answer in the exponential form
$\varphi(1) =$

a.2)
Present the answer in the exponential form
$\varphi(i+0) =$

a.3)
Present the answer in the exponential form
$\varphi(i-0) =$

b) Consider the regular branch of function $\varphi(z) = \ln z$ with a branchcut $z \in [0, +\infty]$ (see. fig. 1(b)).

The regular branch is defined by the condition

$$\varphi(1 - i0) = 0.$$

Find $\varphi(1 + i0)$, $\varphi(i)$ and $\varphi(-i)$.

b.1)
Present the answer in the algebraic form
$\varphi(1 + i0) =$

b.2)
Present the answer in the algebraic form
$\varphi(i) =$

Present the answer in the algebraic form
$\varphi(-i) =$