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Problem 4.7

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Problem 4.7

0.0/2.0 points (ungraded) Consider the function

$$f\left(x
ight) =\ln \left\lceil \left(1+x^{2}
ight) ^{1/2}
ight
ceil ,$$

defined for real x>0 where the branch of the square root is choosen so that $\left(1+x^2\right)^{1/2}>0$ for x>0 and \ln stays for the principal branch of logarithm. Let A denote the union of $\{x:0>x>-\infty\}$ and $\{ix: 1>x>-1\}$. Show that there exists a single--valued function $F\left(z
ight)$ such that $f\left(x
ight)=F\left(x
ight)$ for real x>0and F(z) is analytic in the complement of A. Calculate the following limits (use i for complex unity, sqrt(#) for $\sqrt{\#}$, $e^{(\#)}$ for the exponential and pi for π):

$$\lim_{\epsilon o 0} F(\epsilon) =$$

 $\lim_{\epsilon o 0} F\left(\epsilon e^{3\pi i/4}
ight) =$

 $\lim_{\epsilon o 0} F\left(\epsilon e^{-3\pi i/4}
ight) =$

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