MTH 317/617
Quiz #5

1. Determine the domain of analyticity for the function $f(z) = \text{Log}(z^2)$ and sketch the branch cuts on the complex plane.

Let $z = x + iy$. Therefore,

$$z^2 = x^2 - y^2 + 2ixy$$

and thus $\text{Log}(z^2)$ is not analytic when

$$x^2 - y^2 \leq 0 \quad \text{and} \quad xy = 0$$

$$\Rightarrow x = 0 \quad \text{and} \quad -y^2 \leq 0.$$

Therefore, $\text{Log}(z^2)$ is not analytic on the entire imaginary axis.