

### Practice Exercise For Lecture 10

Q1. Prove that  $\operatorname{cosec}^{-1} z = \frac{1}{i} \log \left( \frac{i + \sqrt{z^2 - 1}}{z} \right)$ ,  $z \in \mathbb{C}$ .

Q2. Separate into real and imaginary parts of  $\tan^{-1}(x + iy)$ .

(Ans. Real part:  $\frac{1}{2} \tan^{-1} \frac{2x}{1 - x^2 - y^2}$ , and imaginary part:  $\frac{1}{2} \tanh^{-1} \frac{2y}{1 + x^2 + y^2}$  )

Q3. For any complex number  $z$ , prove that  $\sinh^{-1} z = \log(z + \sqrt{z^2 + 1})$ .