Main Sitting

Problem 1 (4.5 pts)**.** (a) Find all complex roots of the equation

$$\sin^2(e^z) = \frac{1}{4}.$$

(b) Which of them belong to the stripe $\{z\colon |\operatorname{Im}(z)| < 1\}$?

Solution 1I. (a)

$$\sin^2(e^z) = \frac{1}{4} \iff \sin(e^z) = \pm\frac{1}{2} \iff e^z = \begin{cases} \frac{\pi}{6} + \pi n \\ \frac{5\pi}{6} + \pi n \end{cases}$$

$$\iff z = \begin{cases} \ln(\frac{\pi}{6} + \pi n) + 2m\pi i \\ \frac{5\pi}{} \end{cases}$$