Q4: Note that by definition of $\cos(z)$, we can write

$$\cos(z) = \frac{e^{iz} + e^{-iz}}{2}$$

We wish to find a z such that for all $c \in \mathbb{C}$

$$\frac{e^{iz} + e^{-iz}}{2} = c$$

Take $z = -i\log(-c - \sqrt{c^2 - 1})$. We compute that:

$$\begin{aligned}
\frac{e^{iz} + e^{-iz}}{2} &= \frac{e^{i(-i\log(-c-\sqrt{c^2-1}))} + e^{-i(-i\log(-c-\sqrt{c^2-1}))}}{2} \\
&= \frac{e^{\log(-c-\sqrt{c^2-1})} + e^{-\log(-c-\sqrt{c^2-1})}}{2} \\
&= \frac{\frac{-c-\sqrt{c^2-1}}{1} + \frac{1}{-c-\sqrt{c^2-1}}}{2} \\
&= \frac{1}{2} \cdot \frac{c^2 - 2c\sqrt{c^2-1} + c^2 - 1 + 1}{-c - \sqrt{c^2-1}} \\
&= \frac{1}{2} \cdot \frac{2c(-c - \sqrt{c^2-1})}{-c - \sqrt{c^2-1}} \\
&= c
\end{aligned}$$

We conclude that $\cos(z)$ is surjective onto the complex plane.