1. Let $G$ be an open region in $\mathbb{C}$. Let $f : G \to \mathbb{C}$ be a function and suppose that $f'(z) = 0$ for some $z \in G$. Prove that $f$ cannot be one-to-one on any open neighborhood of $z$. (Hint: for $z_1$ in some punctured neighborhood of $z$, the poles of $1/(f(z) - f(z_1))$ must be simple; but they can be counted by a suitable path integral.)

2. Conway, exercise IX.7.6.

3. Conway, exercise IX.7.9.


5. Conway, exercise X.1.5.