1) Problem 5, page 25.  
Alternative hint for part a): use that an interval in $\mathbb{R}$ is connected.

2) Let $U \subset \mathbb{C}$ be an open, connected subset and $\gamma: [0, 1] \to U$ a continuous curve on $U$. We denote by $\Gamma$ the image of $\gamma$. Let $P = \gamma(0)$, $Q = \gamma(1)$. Prove that there exists points $P_0 = P, P_1, \ldots, P_n = Q$ in $\Gamma$ and $\epsilon > 0$ such that:
   a) For all $i = 0, \ldots, n$, the disk $D(P_i, \epsilon) = \{|z - P_i| < \epsilon\}$ is contained in $U$.
   b) for all $i = 1, \ldots, n$, $P_i \in D(P_{i-1}, \epsilon)$.


4) Problem 9, page 27.

5) Problem 10, page 27.

6) Problem 11, page 27. Note that, properly speaking, for this problem to make sense, we need to assume that both Re($f$), Im($f$) have second derivatives. We will prove this later on.

7) Problem 12, page 27.

8) Let $U \subset \mathbb{C}$ be an open, connected, non-empty subset and $f: U \to \mathbb{C}$ a holomorphic function. Prove that the following are equivalent:
   a) $f$ is constant in $U$.
   b) Re($f$) is constant in $U$.
   c) Im($f$) is constant in $U$.
   d) $\bar{f}$ is holomorphic on $U$.
   e) $|f|$ is constant in $U$.

9) Let $U \subset \mathbb{C}$ be an open, connected, non-empty subset and $f: U \to \mathbb{C}$ a holomorphic function. Suppose there exist non-zero real constants $a, b, c$ such that
   \[ a \text{Re}(f) + b \text{Im}(f) + c = 0 \]
in $U$. Prove that $f$ is constant in $U$.

10) Let $f(z)$ be an entire function and let $g(z) := f(\bar{z})$. Prove that $g$ is entire if and only if $f$ is constant.