1. (a) Write down the $\mathbb{P}$-name $3$ in detail. [1 point]
   
   (b) Let $\tau = \{(\emptyset, p), ([\emptyset, q], r)\}$. Compute $\tau_G$ for each of the 8 possibilities for $p, q, r$ being $\in G$ or $\notin G$. [2 points]

2. In the lecture we saw that if $\mathbb{P}$ is non-atomic, then $\mathbb{P}$-generic filters over $M$ are not in $M$. Prove the converse: if $\mathbb{P}$ is atomic (i.e., not non-atomic), then there exists a $G \in M$ which is a $\mathbb{P}$-generic filter over $M$. [2 points]

   [Hint: let $G = \{p : p \parallel r\}$ for suitable $r$.]

3. A subset $D \subseteq \mathbb{P}$ is called dense below $p$ if $\forall q \leq p \exists r \leq q (r \in D)$.
   
   (a) Let $D \subseteq \mathbb{P}$. Show that, if $\{q : D \text{ is dense below } q\}$ is dense below $p$, then $D$ is dense below $p$. [1 point]
   
   (b) Show that if $D \in M$ is dense below $p$ and $G$ is $\mathbb{P}$-generic over $M$, then
   
   $$p \in G \Rightarrow G \cap D \neq \emptyset$$

   [2 points]

4. Let $\mathbb{P}$ be non-atomic and let $M$ be a countable transitive model. Prove that
   
   $$|\{G : G \text{ is a } \mathbb{P}\text{-generic filter over } M\}| = 2^{\aleph_0}.$$ [2 points]