1 Recall the definition of language classes ZPP, RP and its complement coRP given in the reading. 
**Show that** $ZPP = RP \cap coRP$.

2. Language class BP·NP is defined: $BP\cdot NP = \{L : L \leq_P 3SAT\}$.

A nondeterministic circuit has two inputs $x, y$. We say that it accepts $x$ iff there exists $y$ such that $C(x, y) = 1$. The size of the circuit is measured as a function of $|x|$. Let $NP/poly$ be the languages that are decided by polynomial size nondeterministic circuits. 
**Show that** $BP\cdot NP \subseteq NP/poly$.

3. Language class BPL is defined: 
$L \in BPL$ if there is a $O(\log n)$-space PTM $M$ such that for every $x \in \{0, 1\}^*$, 
$Pr[M(x) = L(x)] \geq 2/3$. 
**Show that** $BPL \subseteq P$ 
Hint: Use dynamic programming (involving matrix products) to determine the probability the probabilistic machine ends up in the accept configuration.