CPS240
Homework 3
Due March 25 2009

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·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·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.