Due Monday, November 6.

1. For each of the following, determine if the statement is true or false. Briefly explain your answers.
(a) $n^{2} \in O(n)$.
(c) $n^{3}+\sqrt{2^{n}} \in O\left(n^{3}\right)$.
(b) $n^{2}+3 \log n \in O\left(n^{2} \log n\right)$.
(d) $2^{2^{n}} \in O\left(n^{n}\right)$.
2. Prove that $\left\{w \in\{0,1\}^{*}: w\right.$ is a binary number divisible by 5$\}$ can be decided in $O(n)$ time by a TM.
3. Suppose that $L, K \subset\{0,1\}^{*}$ are languages in class $P$. Prove the following are also in class $P$.
(a) The complement of $L$.
(b) The union $L \cup K$.
