HW 8 CMSC 452. DUE DUE April 3

(NOTE- I will be out-of-town March 27 and Apr 1. There will be a sub. The material he teaches is part of the course. You have plenty of time to do this HW so the Due date is DUE DUE. Still THINK of it as due April 1, though don't hand it in that day.)

1. (0 points) What is your name? Write it clearly. Staple your HW. When is the midterm? Where is the midterm? When is the Final?

2. (0 points but DO IT) READ my notes on P and NP up to but NOT INCLUDING the section on the Polynomial Hierarchy.

3. (50 points) Show that if $A \in NP$ then $A^* \in NP$. Use the quantifier definition of NP.

4. (50 points) Let

$$FACT = \{(n, m) \mid (\exists L < m)[L \text{ divides } m]\}.$$

Let f be the function that, on input n, outputs the prime factorization of n. (For example, $f(100) = ((2, 2), (5, 2))$ which represents that $f(100) = 2^2 \times 5^2$.)

Show that if $FACT \in P$ then the FUNCTION f can be computed in polynomial time.

RECALL- the number n has length $\log_2 n$. You may assume that determining if a number if PRIME is in poly time. HINT: Read the NP notes on the class website.