115 Homework 4

Due Friday October 29

Question 1 Definition: if p is prime and $p^a|n$ while $p^{a+1}\not|n$ we say that p^a divides n *exactly* and write $p||n$. (Rosen 3.4.12) Show that $p^a||m \Rightarrow p^{ka}||m^k$.

Question 2 (Rosen 3.4.17,18) Find all $n \in \mathbb{N}$ such that $n!$ ends with 74 zeros (in base ten). Show $n!$ never ends with 153, 154 or 155 zeros.

Question 3 (Rosen 3.5.4 a,c,e) Use Fermat's method to factor 8051, 46009 and 3,200,399.

Question 4 (Rosen 3.5.20) Find all primes $2^{2^n} + 5$ where $n + 1 \in \mathbb{N}$.

Question 5 (Rosen 3.6.14) A piggy bank contains $\$2$ made from 24 coins which are nickels, dimes and quarters. What combinations of coins are possible?