Sample outline for problem set 01
Math 127

Definitions: The definitions you should copy from the class notes/text are: (2.1) Divides, divisor; associates, up to associates. (2.2) Common divisor; greatest common divisor. (2.3) Floor.

Note that you do not need to copy theorems from the text for the outline; in fact, I prefer that you don't, though I won't take off points for it.

Below are problem plans for 2.1.1(a), 2.1.4, 2.2.2, 2.2.3, 2.3.4(a,b), 2.4.1(c,f), 2.4.2(d,e). Remember that you only have to do the problems that are assigned on the web page, and not all of the ones in each section. Abbreviations: **A**= Assume, **C**= Conclude.

2.1.1(a). **A**. d divides n.

(stuff)

C. $-d$ divides n.

2.1.4. **A**. $d, a, b \in \mathbf{Z}$.

A. d divides a and a divides b.

(stuff)

C. d divides b.

2.2.2.

(a) Exploration: Write out factors of 24, 45, 36, look for patterns.

(b) **A**. d, q, a positive integers, $a = dq$, $d \leq q$.

(stuff)

C. So $d \leq \sqrt{a}$.

(c) Explain how to group divisors into pairs and why number of divisors of a is $\leq 2\sqrt{a}$.

2.2.3. Find a Naive Algorithm that uses no more than $C\sqrt{N}$ divisions to determine the GCD of two numbers $a, b \leq N$.

2.3.4(a). Exploration: Find a and d such that there are at least two possible q and r that satisfy (2.3.5).

(b) Exploration: Find condition on a and d that describes when q and r are not unique.

2.4.1(c,f). Apply Euclidean Algorithm to compute GCDs.

2.4.2(d,e). Apply Signed Euclidean Algorithm to compute GCDs.