Math 430 HW 1 Due 01/11/08

Unless otherwise noted, homework problems are from *Abstract Algebra, 3rd Edition* by Dummit & Foote.

1. **[60pts (10pts each)]** Do problems 1, 3, 4, 5, 6, 7 in section 0.1.
2. **[10pts (5pts each)]** Do problems 1b and 1f in section 0.2.
3. **[50pts (10pts each)]** Do problems 4, 7, 9, 10, 11 in section 0.2
4. **[20pts]** Prove Theorem 1:

   Theorem 1. *Let a and b be positive integers. Let $a = qb + r$ with q and r non-negative integers such that $0 \leq r < b$ (in other words, r is the remainder when a is divided by b). Then* $\gcd(a, b) = \gcd(b, r)$.

5. **[10pts]** Log in to modular.math.jmu.edu via SSH using your e-ID name and password. Use Sage to find the gcd of the following numbers:

$$
\begin{aligned}
a &= 453636594310879134494376838395065855974787940 \\
&\quad 855257328121642329601155920343928806438842762 \\
&\quad 176955489104870750046385522056251341033655470 \\
&\quad 488330079111559
\end{aligned}
$$

$$
\begin{aligned}
b &= 891906042451212842359007411452458179429843916 \\
&\quad 639500283350764035252331803495078394634981294 \\
&\quad 229350415017796124752982897656691447781437478 \\
&\quad 22969716257879
\end{aligned}
$$

   Put the result in a plain text file called `HW_01_gcd_problem` in a subdirectory call `Math_430_HW_01` of your home directory. Set the permission of the subdirectory (but not your home directory!) so that the user group 'faculty' has read and execute permission. Set the permission of the file so that the user group 'faculty' has read permission on the file. If you don't know how to do any of this, then go read about it on the internet.