Math 311 Solution
Quiz 3 26 September 2002

1. State the division algorithm.

   Solution: Let a and b be integers with $b > 0$. Then there exist unique integers q and r such that

   $$a = bq + r$$

   with $0 \leq r < b$.

2. Suppose G is a cyclic group of order 33 and a is a generator of G. What does the Fundamental Theorem of Cyclic Groups say about the subgroups of G?

   Solution: The subgroups of G are all cyclic. For each divisor k of 33, there is exactly one subgroup of order k, and it is generated by $a^{33/k}$. In this case, the subgroups of G are

   $\langle a \rangle$, of order 33,
   $\langle a^3 \rangle$, of order 11,
   $\langle a^{11} \rangle$, of order 3, and
   $\langle e \rangle$, of order 1.