Practice sheet for Test 2, Math 3330, Spring 2016

1. Label each of the following statement as either true or false/

(a) If for integers a and b one has that $e = xa + yb$ then for $d = (a,b)$ one has that $e|d$.

(b) For any integer a one has $(a,1) = 1$.

(c) Let a and b be integers, not both zero, such that $d = (a,b)$. Then $(a,b) = (a,-b)$.

(d) Let a be an integer., then $(a, a+2) = 2$.

(e) Assume that for the prime p that $p|ab$. The $p|a$ and $p|b$.

(f)The empty set $\emptyset$ is $n,$ roup.

(g) The set $\mathbb{Z}$ of all integers is a non-abelian group with respect to subtraction.

(h)For any $n,$ the elements different from zero of the integers modulo n form a group with respect to multiplication.

(i)The set $\mathbb{R}\backslash\{0\}$ of nonzero real numbers is a nonabelian group with respect to division.

(j) If in a group one has that $xy = xz$ one has that $y = z$.

2. Let a and b be integers, at least one of them not 0. Let $d = (a,b)$. Then an integer c is of the form $c = xa + yb$ iff $d|c$.

3. In any group, for given $a, b \in G,$ the equation $a * x = b$ has a unique solution x.

4. Let G be a group with 3 elements, $G = \{1, x, y\}$. Prove that $xy = e$.

5. Find the multiplicative inverse of $5 \bmod(14)$, that is $[5]_{14}^{-1}$ and solve
$5x + 2 = 0 \bmod(14)$

6. If you have $1 = xm + yn$ Then $[m]_n^{-1}$ exists and is $[x]_n$.