

## MATH 55 - WORKSHEET 2 (THURSDAY)

1

a Use the euclidean algorithm to find  $\gcd(12, 18)$ . Express this as a linear combination of 12 and 18.

b Use the euclidean algorithm to find  $\gcd(111, 201)$ . Express this as a linear combination of 111 and 201.

2 Show that  $\log_2 3$  is an irrational number.

3 Show that if  $a$  and  $b$  are positive integers, then  $ab = \gcd(a, b) \cdot \text{lcm}(a, b)$ . [Hint: Use the prime factorizations of  $a$  and  $b$ ]

4 Find an inverse of  $a \bmod m$  for each of these pairs of relatively prime integers

a  $a = 4, m = 9$

b  $a = 55, m = 89$

5 Solve each of these congruences using the inverses found in the previous exercise

a  $19x \equiv 4 \pmod{141}$

b  $55x \equiv 34 \pmod{89}$