

## Review Problems

1. Find  $\gcd(7605, 5733)$ , and express it as a linear combination of 7605 and 5733.
2. For  $\omega = -\frac{1}{2} + \frac{\sqrt{3}}{2}i$ , prove that  $\omega^n = 1$  if and only if  $3|n$ , for any integer  $n$ .
3. Solve the congruence  $24x \equiv 168 \pmod{200}$ .
4. Solve the system of congruences  $2x \equiv 9 \pmod{15}$   $x \equiv 8 \pmod{11}$ .
5. List the elements of  $\mathbf{Z}_{15}^\times$ . For each element, find its multiplicative inverse, and find its multiplicative order.
6. Show that if  $n > 1$  is an odd integer, then  $\varphi(2n) = \varphi(n)$ .