

Do the following exercises from the text:

Section 4.1: 5, 8, 26, 27

Section 4.2: 1 (b), (d); 6 (a)

Section 4.3: 5, 7, 8, 23

Section 5.1: 1 (b) (d); 4, 5

Problems not from the text:

1. For each part, find the smallest positive x that solves the simultaneous congruences.

(a) $x \equiv 3 \pmod{7}$ and $x \equiv 5 \pmod{9}$

(b) $x \equiv 3 \pmod{37}$ and $x \equiv 1 \pmod{87}$.

2. Show that the integers $m = 3^k \cdot 568$ and $n = 3^k \cdot 638$, where $k \geq 0$, satisfy simultaneously

$$\tau(m) = \tau(n), \quad \sigma(m) = \sigma(n), \quad \text{and} \quad \phi(m) = \phi(n).$$

3. Establish each of the following assertions:

(a) If n is an odd integer, then $\phi(2n) = \phi(n)$.

(b) If n is an even integer, then $\phi(2n) = 2\phi(n)$

(c) $\phi(3n) = 3\phi(n)$ if and only if $3 \mid n$.

(d) $\phi(3n) = 2\phi(n)$ if and only if $3 \nmid n$.