1. Compute the remainder when the first integer is divided by the second.
   (a) 7^{1001}, 17 (b) 30^{2020}, 19
   (c) 15^{1976}, 23 (d) 43^{5555}, 31
   (e) 7^{1020}, 15 (f) 25^{2550}, 18
   (g) 79^{1776}, 24 (h) 199^{2020}, 28

2. Compute $\varphi(m)$ for each of the following m.
   (a) 32 (b) 120 (c) 200 (d) 384 (e) 3675

3. Find each of the following:
   (a) $2^{25} \pmod{21}$
   (b) $7^{66} \pmod{120}$
   (c) the last two digits of $1 + 7^{162} + 5^{121} \cdot 3^{312}$.

4. For each part find the smallest positive x that satisfies the given simultaneous congruences.
   (a) $x \equiv 3 \pmod 7$ and $x \equiv 5 \pmod 9$.
   (b) $x \equiv 3 \pmod{37}$ and $x \equiv 1 \pmod{87}$.
   (c) $x \equiv 5 \pmod 7$ and $x \equiv 2 \pmod{12}$ and $x \equiv 8 \pmod{13}$.