Modular Arithmetic Practice Exercises

1. For each of the following computations modulo $n$, write the unique answer, $r$, such that $0\leq r\leq n-1$.

a) $5+6≡\overline{ } (mod 8) $

b) $4+6≡\overline{ } (mod 8) $

c) $3+5≡\overline{ } (mod 8) $

d) $4⋅5≡$ $\overline{ } (mod 7)$

e) $4⋅5≡$ $\overline{ } (mod 6)$

f) $4⋅5≡$ $\overline{ } (mod 5)$

g) $17⋅19≡$ \_\_\_\_\_\_ (mod 5)

h) $41⋅33⋅25≡$\_\_\_\_\_\_\_\_ (mod 8)

2. For each of the following modulo $n$ “equations” (technically they are called “congruences”), find the mod $n$ solution set; that is, find all solutions, $x$, such that $0\leq x\leq n-1$, where $n$ is the modulus of the “equation.”

a) $3x+2≡5 \left(mod 8\right)$

b) $3x+5≡2 (mod 8)$

c) $2x≡5 \left(mod 9\right)$

d) $3x≡5 (mod 9) $

e) $3x≡6 (mod 9)$