

**Problem 1.** *Write out the multiplication table mod 10.*

(a) *Which numbers mod 10 are zero divisors?*

(b) *Which numbers mod 10 have square roots?*

**Problem 2.** *Working mod 10, solve the equation  $3x = 6$  for  $x$ .*

**Problem 3.** *Working mod 10, solve the equation  $2x = 6$  for  $x$ .*

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**Problem 4.** *Write out the multiplication table mod 7.*

(a) *Which numbers mod 7 are zero divisors?*

(b) *Which numbers mod 7 have square roots?*

**Problem 5.** *Working mod 7, solve the equation  $3x = 2$  for  $x$ .*

**Problem 6.** *Working mod 7, solve the equation  $x^2 + 2x + 4 = 0$  for  $x$ .*

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**Problem 7.** Write out the truth table for the expression “ $A$  and ( $B$  or  $C$ )”. Does it have the same meaning as “( $A$  and  $B$ ) or  $C$ ”?

**Problem 8.** Write out the truth table for “( $A$  xor  $B$ ) and ( $C$  or  $A$ )”.

**Problem 9.** Suppose you run a health insurance software company. The company policy states that a customer can be on their parent’s policy if they are under 18, or if they are a student under 24. You are trying to determine the customer’s eligibility and know whether a customer is a student ( $A$ ) and their age ( $x$ ).

(a) What comparisons will your software need to make? Call them  $B$  and  $C$ .

(b) Write down a boolean expression using  $A$ ,  $B$ , and  $C$  that tells you whether the customer is eligible to be on their parent’s policy.