Worksheet 5

Math 391, Abstract Algebra

Friday, October 9, 2020

0. Introduce yourself to your colleagues. Have they heard any good jokes lately?

1. Write down a few zip codes that are meaningful to you. For each one, decide whether it's a multiple of:

   (a) 2

   (b) 5

   (c) 3 (add up the digits)

   (d) 9 (add up the digits)

   (e) 11 (take the alternating sum of the digits)

   (f) 7 (chop off the last digit, take what's left minus 2 times that digit, then repeat)

   Go around the group, taking turns showing your work to each other.

2. Challenge: Computer programmers often deal with numbers written in base 16, called hexadecimal, using A to represent 10, B for 11, C for 12, D for 13, and E for 15. So the university's zip code 97403 would be 17C7B in hex, because

$$1 \cdot 16^4 + 7 \cdot 16^3 + 12 \cdot 16^2 + 7 \cdot 16 + 11 = 97403.$$

   Web designers most often encounter hexadecimal numerals when dealing with colors: for example, this color of orange is described as E95420: the red value is E9 in hex which is $5 \cdot 16 + 9 = 249$ in decimal, the green value is 42 in hex which is $4 \cdot 16 + 2 = 66$ in decimal, and the blue value is 20 in hex which is $2 \cdot 16 + 0 = 32$ in decimal.

   Come up with some divisibility criteria for hexadecimal numerals.