

MATH 3/4: ASSIGNMENT 16

MAY 16, 2010

We use base-ten, or decimal, system: by 234 we mean

$$2 \times 100 + 3 \times 10 + 4 \times 1.$$

We use ten digits: $0, \dots, 9$; and *powers* of 10: 1, 10, 100, 1000, \dots

Computers use base-two, or *binary*, system, they use only two digits: 0 and 1; and *powers* of 2: 1, 2, 4, 8, 16, 32, \dots

By 101 they mean

$$1 \times 4 + 0 \times 2 + 1 \times 1 = 5.$$

CLASSWORK

1. You have three bills: 1 dollar bill, 2 dollar bill, and 4 dollar bill. Show that you can pay any amount from 1 to 7 dollars without change.
2. You have the same three bills (1,2, and 4) and one more bill. Using these four bills you can pay any sum from 1 to 15 dollars without change. What is your fourth bill?
3. Continue the sequence: 0, 1, 10, 11, 100, 101, 110, 111, \dots
4. Write 25th element of the sequence.
5. Write 27 in binary system.
6. Write 10110 in decimal system.
7. Write $2+2=4$ in binary system.
8. Find $101+11=?$
9. Find $110+11=?$

HOMEWORK

1. Write the following numbers in binary system:
(a) 32 (b) 41 (c) 57
2. Write the following numbers in decimal system.
(a) 1111 (b) 101010 (c) 110011 (d) 11101111
3. Compute the following sums.
(a) $1010 + 111 =$
(b) $1111 + 11 =$
(c) $100100 + 101010 =$
(d) $10110111 + 11001110 =$
Convert the equalities to the decimal system.
4. In the classroom some chairs have 3 legs and the others have 4 legs. In total there are 6 chairs and 20 legs. How many 3-leg chairs and how many 4-leg chairs are there?
5. Replace some of the minuses with pluses to make this true:
$$1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 = 5$$
6. A farmer was selling apples for two days. He sold 60 apples each day. On the first day, he sold 30 apples at the price 3 apples for 1 dollar, and 30 apples at the price 2 apples for 1 dollar. On the second day, he sold all 60 apples at the price 5 apples for 2 dollars. When did he make more profit: on the first day or on the second?