

Problem set 6, assigned on 10/23/19

1. Convert the following numbers from binary (base 2) to decimal (base 10):

- (a) 111
- (b) 1101
- (c) 10000000.

2. Convert the following numbers from decimal to binary:

- (a) 8
- (b) 15
- (c) 32
- (d) 31
- (e) 53.

3. Add these binary numbers using the column addition algorithm:

- (a) $1000+101$
- (b) $11011+111111$

4. In class we discussed the game of Nim with heap sizes 3, 4, 5, and a winning strategy for the first player using the notion of *nim-sum*. Which player has a winning strategy when heap sizes are 3, 4, 6? How about 3, 4, 7?

5. Play the game of Nim!