
CMSC 201 Fall 2016

GRS Worksheet – Week 2 – Binary/Decimal Conversions

Gaining Knowledge:

Binary is a very important part of computer science, although it often seems to hang around in the background of what's going on. Not only is all of the information in a computer represented in binary, but the on/off method of storing data is also used for storing information on DVDs (reflect light/don't reflect light). We've also seen a similar situation with the True/False options when we make a decision in our flowcharts or pseudocode.

We don't expect you to be able to "read" binary the way you can read decimal numbers. But by the end of CMSC 201, you should understand it and be able to convert between the binary and decimal number systems.

Refresher Course:

Converting from binary to decimal will be easier for most people, because the answer you're calculating is in the number system you're most comfortable with. To convert from binary to decimal, simply determine how much each column is worth, and add together the values of the columns that contain a "1". You don't have to do any multiplication, because every column is worth either itself (times 1) or zero (times 0).

Converting from decimal to binary can be a bit trickier; instead of adding given numbers together, you first have to figure out where to start. You're also going to have to go from left to right, counting from high to low. You should start by figuring out the largest binary column that is still smaller than the decimal number you're converting.

Binary Conversion Tips:

- #1 You should never have anything other than "0" or "1" – if you write down a "2" you've made a mistake and need to go back.
- #2 Odd numbers should always have a "1" in the ones column. (Why?)
- #3 You need the next column "up" to be able to represent that number. (In other words, you can't represent 16 without the sixteens column.)

Practice Makes Perfect:

You won't have any dot cards or your binary flip card with you during the exam (and you probably won't carry them around the rest of your life either), so you need to be able to convert between binary and decimal on paper.

Tens to Twos:

Convert the following numbers to binary on your own, then check your work with your partner and table. It might help to write down the binary "columns" so you can refer to them throughout, or to draw and use a conversion table.

55

126

99

101

Twos to Tens:

Convert the following numbers to decimal on your own, then check your work with your partner and table. It might help to write down the binary "columns" so you can refer to them throughout, or to draw and use a conversion table.

1010 1010

0010 1101

1111 1111

1000 1000
