Now it is your turn, you will want to write this down, with steps showing how you found the value so that we can give you lab credit:

i. 1111

$8+4+2+1 = 15_{10}$

ii. 1000

$8+0+0+0 = 8_{10}$

iii. 1000 1000 (a much bigger number, but remember to just keep doubling the place values as you move to the right)

$128+8 = 136_{10}$

iv. 11 1010 (while not all people or programs do this, notice how I have the bits in groups of four? This will be to help us with a shortcut when I get to hexadecimal)

$32+16+8+0+2+0 = 58_{10}$

---

g. Now it is your turn, be sure to write these down in a file along with the other values for this lab to get credit (please show your binary values grouped into groups of four, grouping them starting from the right, so 73 would be 100 1001, grouped starting from the right)

i. 127

127-64 | 63-32 | 31-16 | 15-8 | 7-4 | 3-2 | 1-1
1 | 1 | 1 | 1 | 1 | 1 | 1
64 | 32 | 16 | 8 | 4 | 2 | 1

$= 111\ 1111_2$

ii. 63

63-32 | 31-16 | 15-8 | 7-4 | 3-2 | 1-1
1 | 1 | 1 | 1 | 1 | 1
32 | 16 | 8 | 4 | 2 | 1

$= 11\ 1111_2$

iii. 15

(these first three should show you something about the relationship between the powers of two and the value one less than that)

15-8 | 7-4 | 3-2 | 1-1
1 | 1 | 1 | 1
8 | 4 | 2 | 1

$= 1111_2$

iv.72 (this value should be somehow closely relate d to the 73 we did up above as an example)

72-64=8 8-8=0

1 0 0 1 0 0 0
64 32 16 8 4 2 1

$= 100\ 1000_2$

v.
65 (this value should also be related to the example of 73 up above... what is it?)

65-64

1-2

1 0 0 0 0 0 1 = 1000001_2

$73 - 65 = 8 = 1000_2$ so..

1000001
+ 1001
1001001 = 73

Now it is your turn, convert the following into decimal assuming that they are hexadecimal to start with

i.
5

5

ii.
8

8

iii.
14
(the above are not trick questions, but should show you that small numbers are easy)

E

iv.
AA

$10 \cdot 16 + 10 = 170$

v.
CAD

$12(256) + 10(16) + 13 = 3245$

K. Now your turn

i. 53

53-32

1 1 0 1 0
32 16 8 4 2 1

110101 = 0x35
11 11
3 5

ii. 187

187-128 59-32 27-16 11-8

1 0 1 1 1 0 1 1 = 10111011 = 0xBB
128 64 32 16 8 4 2 1 11 11

c.
Now without much more demonstration, how about you try it! Write the following in two's compliment with 4-bit numbers

i.
3

0011

2+1 = 3

ii.
7

0111

4+2+1 = 7

iii.
-4

1100

-4

d.
Now do something more than just using a table, show the work on some addition for lab credit
i.
3 + 4

```
  0011
+ 0100
------
  0111   = 7
```

ii.
-2 + 2

```
  11
  1110
+ 0010
------
  0000   = 0
```

iii.
-2 + -6

```
  11
  1110
  1010
------
  1000   = -8
```

iv.
3 + 5 (notice that this one does something strange... and to find out what it might be, try looking up a concept called overflow)

```
  111
  0011
  0101
------
  1000 = -8. Should be 8 but overflows.
```