**1. (4.1 Largest radix-r number)**

Since X0=1, we can define a function which has the value of a string of decimal digits.

(dN−1, .., d0)10 = (N−1)∑(i=0) di ∗ 10i

The function defines the value of radix-10,

For radix-2, the right side should be di ∗ 2i

More generally for radix-r, we’ll get di ∗ ri

Then we can prove that the largest number we can represent with

N digits of radix r is rN – 1

2. (4.2 Carry bits)

3. (4.3 Complement number range)

4. (4.4 2's complement operation)

5. (4.5 Sign extension)

**6. Using the technique presented in section 4.1, convert the following decimal number to binary**

107

107 53 26 13 6 3 1

1 1 0 1 0 1 1

107 to decimal is: 1101011

2312

2312 1156 578 289 144 72 36 18 9 4 2 0

0 0 0 1 0 0 0 0 1 0 0 1

2312 to decimal is: 100100001000

31333

31333 15666 7833 3916 1958 979 489 244 122 61 30 15 7 3 1

1 0 1 0 0 1 1 0 0 1 0 1 1 1 1

31333 to decimal is: 111101001100101

97

97 48 24 12 6 3 1

1 0 0 0 0 1 1

97 to decimal is: 1100001

**7. Perform the following subtraction operations using complements as described in section 4.2**

103-92

1027-11

129-33

2222-222

8. Convert the following decimal numbers to 8-bit two's complement

-91

-96

-126

101

78