Introduction to Computer Science.
HW #4

Problem 1

a) $b = 7 \quad n = 4$

Smallest $= -b^{n-1} = -(7^{4-1}) = -343$

Largest $= b^{n-1} - 1 = 7^3 = 342$

As 0 is part of positive number that's why we subtract 1 to calculate largest number.

b)

7^3	7^2	7^1	7^0	
6	6	6	6	-1
6	6	5	6	-8

$6666_7 = -1_{10}$ ✓

$6656_7 = -8_{10}$ ✓

c)

6666
6656
6655

6655_7

343	49	7	1
6	6	5	5

$-343 + 334$

$= \boxed{-9}$

Problem 2

a) ~~293~~ 293.15

i)

256	128	64	~~32~~	16	8	4	2	1
1	0	0	1	0	0	1	0	1
128+7	1	0	0	0	0	1	1	1

256 + 32 + 4 + 1 = **293.**

ii) normalization

$100100101 = 1.00100101 \times 2^{8}$

$8 + 127 = 128 + 7 = 10000111$

iii) 0.65 to binary.

0.65 x 2 = 1.3 1
0.3 x 2 = 0.6 10
0.6 x 2 = 1.2 101
0.2 x 2 = 0.4 1010
0.4 x 2 = 0.8 10101
0.8 x 2 = 1.6 101011
0.6 x 2 = 1.2 1010111
0.2 x 2 = 0.4 10101110
0.4 x 2 = 0.8 101011101
0.8 x 2 = 1.6 1010111011
0.6 x 2 = 1.2 10101110111

0 | 1 2 3 4 5 6 7 8 | 9 0 1 2 3 4 5 6 7 8 9 | 0 1 2 3 4 5 6 7 8 9 0 1 2
0 | 1 0 0 0 0 1 1 1 | 0 0 1 0 0 1 0 1 0 1 0 | 1 0 1 0 0 1 1 0 0 1 1 0

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

b) 293.65

binary = 100100101.101001100011 from a part.

= 293.6499

error = $\pm 0.01 \quad \frac{293.649}{293.65} \times 100$

= ~~0.001%~~ 0.1 % error.

```
C:\Users\Faraz Ahmad\Desktop>ghci
GHCi, version 9.0.1: https://www.haskell.org/ghc/  :? for help
ghci> :l sub
[1 of 1] Compiling Main             ( sub.hs, interpreted )
Ok, one module loaded.
ghci> sub 's'
'$'
ghci> sub 'a'
'@'
ghci>
```

```
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ghci> sub 's'
'$'
ghci> sub 'a'
'@'
ghci> [sub c | c <- "hello world"]
"#3110 w0r16"
ghci>
```