



**Computer
Science**

COMPSCI 210 S1 T 2007

Assignment Four

The work done on this assignment must be your own work. Think carefully about any problems you come across, and try to solve them yourself before you ask anyone else for help. Under no circumstances should you work together with another student to solve problems posed in assignments. Note: You must show all your working steps; otherwise no mark will be given even if your answer is completely correct.

Assessment

Due: **4:00 pm 25 May 2007** (No Bonus/Penalty)
Worth: **3.33%** of your final mark

Submission

Please use PEN to write your answer on this question paper. You must make sure your marker can read your handwriting. Submit your assignment (with a cover sheet) to **Tamaki Student Resource Centre** before **4pm** on the due date.

Questions

Question 1: Unicode Conversion (6 marks)

Convert a UCS-2 character to UTF-8 form character. Give your answer in hexadecimal. The USC-2 character is based on your UPI (login name). Take the first **FOUR** characters from your UPI. Take each character and convert it to a number based on the following table. If the character is a digit, just take the number. Next, take the number modulus by 16. Write down the number in Hexadecimal.

The conversion table is given as follows

Letter	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
Nbr	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

An example is given as follows:

UPI: kwon123

The first four characters: kwon

Character	Number	Modulus by 16	Hex
k	10	$10 \bmod 16 = 10$	a
w	22	$22 \bmod 16 = 6$	6
o	14	$14 \bmod 16 = 14$	e
n	13	$13 \bmod 16 = 13$	d

The UCS-2 character: a6ed. Now, convert **a6ed** to UTF-8 form. Show all your working steps.

Answer:

UPI: _____

The first four characters: _ _ _ _

Character	Number	Modulus by 16	Hex

The UCS-2 character: __ __ __ __. Now, convert it to UTF-8 form. Show working steps.

Question 2: IEEE Floating Point Conversion (20 marks)

- (A) A 32-bit IEEE floating point number consists of 1 sign bit, 8 exponent bits and 23 mantissa bits. Convert a special number to decimal. Write the decimal number in Scientific Notation (e Notation). You can use calculator to work out the number in Scientific Notation. Again, the special number is based on your UPI. Take the first **THREE** characters from your UPI. Take each character and convert it to a number based on the previous table. Next, take the number modulus by 16. Write down the number in Hexadecimal and concatenate the number with 5 ZERO at the end.

An example is given as follows:

UPI: kwon123

The first three characters: kwon

Character	Number	Modulus by 16	Hex
k	10	$10 \bmod 16 = 10$	a
w	22	$22 \bmod 16 = 6$	6
o	14	$14 \bmod 16 = 14$	e

The special number is: a6e00000. Now, convert a6e00000 to decimal number. Show all your working steps. (Sign = -ve, exponent = -50, mantissa = 1.75, decimal number = $-1 \times 1.75 \times 2^{(-50)} = -1.55\text{E-}15$)

Answer:

UPI: _____

The first three characters: __ __ __

Character	Number	Modulus by 16	Hex

The floating point number is ____ 00000. Convert it to a decimal number in Scientific Notation.

- (B) Convert another special number to decimal. Write the decimal number in Scientific Notation (e Notation). Take the LAST **THREE** characters from your UPI. Take each character and convert it to a number based on the previous table. Next, take the number modulus by 16. Write down the number in Hexadecimal and concatenate the number with 5 ZERO at the end.

An example is given as follows:

UPI: kwon123

The LAST three characters: 123

Character	Number	Modulus by 16	Hex
1	1	$1 \bmod 16 = 1$	1
2	2	$2 \bmod 16 = 2$	2
3	3	$3 \bmod 16 = 3$	3

The special number is: 12300000. Now, convert 12300000 to decimal number. Show all your working steps. (Sign = +ve, exponent = -91, mantissa = 1.375, decimal number = $-1 \times 1.375 \times 2^{(-91)} = 5.55\text{E-}28$)

Answer:

UPI: _____

The LAST three characters: ____

Character	Number	Modulus by 16	Hex

The floating point number is ___ ___ ___ 00000. Convert it to a decimal number in Scientific Notation.

Question 3: IEEE Floating Point Arithmetic (8 marks)

Take the Floating point number in Question 2A and it to itself. Write the answer in hexadecimal.

An example is given as follows:

The Floating point number in (2A) = a6e00000

Now, evaluate a6e00000 + a6e00000.

Evaluate ___ ___ ___ 00000 + ___ ___ ___ 00000

Question 4: IEEE Floating Point Arithmetic (8 marks)

Evaluate $40600000 - 3FA00000$

Question 5: IEEE Floating Point Arithmetic (8 marks)

Evaluate $416E0000 / 40880000$