

# ICS Homework Week 5

October 15, 2021

- Byte Ordering & C Pointers** Given the following definition of C variables, fill in the table below. You need to give the value of each expression for big-endian and little-endian, respectively.

```

1 int a = 0xdeadbeaf;
2 unsigned char *p_a = (unsigned char *)&a;
3
4 char s[] = {1, 2, 3, 4, 5, 6, 7, 8};
5 short *p_s = (short *)(s + 1);

```

*0x71 0~8 3 4 5 6 7 8 8*

Expression	Little-endian	Big-endian
p_a[0]	<i>0xaf</i>	<i>0xde</i>
p_a[1]	<i>0xbe</i>	<i>0xad</i>
p_a[2]	<i>0xad</i>	<i>0xbe</i>
p_a[3]	<i>0xde</i>	<i>0xaf</i>
s[0]	<i>1</i>	<i>1</i>
*(s+7)	<i>8</i>	<i>8</i>
p_s[2]	<del><i>0x71</i></del> <i>0x0706</i>	<del><i>0x67</i></del> <i>0x0607</i>

*不是 s[7] = {'1', '2', ..., '8'} !*

- Integer Encoding** Given the following C expressions, give their binary encoding in binary or hex format. Assume the C code runs on a x86-64 machine.

```

1 int32_t i1 = 3;
2
3 char c1 = 7;
4 char c2 = -7;
5 short s1 = -7;
6
7 int i1 = -1;
8 int i2 = 0xffffffffc;

```

```

9  int i3 = ~i2 + 1;
10 int i4 = ~-i2 + 1;
11
12 char *str = "1234567";
13 char delta = str[7] - str[0];

```

*0 - 0x31 = 0xcf*

Expression	Binary Encoding
l	0x00000003
c1	0x07
c2	0xF9
s1	0xFFFF9
i1	0xFFFFFFFF9
i3	0x00000004
i4	0xFFFFFFFFC
delta	<del>0xD9</del> 0xcf

3. **Type Casting** Assume we are using **64-bit machine**. Consider the following program.

```

1  char a = -6;
2  unsigned char b = a;
3  unsigned short c = a;
4  int d = a;
5  short e = 0xcafe;
6  unsigned char f = e;
7  unsigned int g = e;

```

Write the value of variables below in decimal.

Variable	Value
a	-6
b	250
c	65530
d	-6
e	-13570
f	254
g	4294953726