ICS Homework Week 4

October 8, 2022

1. **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.

```c
int a = 0xdeadbeaf;
unsigned char *p_a = (unsigned char *)&a;

char s[] = {1, 2, 3, 4, 5, 6, 7, 8};
short *p_s = (short *)(s + 1);
```

Expression	Little-endian	Big-endian
p_a[0]	0xaf	0xde
p_a[1]	0xbe	0xad
p_a[2]	0xad	0xbe
p_a[3]	0xde	0xaf
s[0]	1	1
*(s+7)	8	8
p_s[2]	0x0706	0x0607

2

2. **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.

```c
int32_t l = 3;

char c1 = 7;
char c2 = -7;
short s1 = -7;

int i1 = -1;
int i2 = 0xfffffffc;
```

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

Expression	Binary Encoding
l	0x00000003
c1	0x07
c2	0xf9
s1	0xfff9
i1	0xffffffff
i3	0x00000004
i4	0xfffffffc
delta	0xcf