# Solution

### Problem 1

- [1] 1111 1110 [2] 0010
- [3] 1000 [4] 1111 1110
- [5] 0000 0001 [6] 0011 0100

### Problem 2

- [1] 0x102030 [2] 0x7e4
- [3] 0x1fffffff fffffffe [4] 0xefcdab89 67452301
- [5] 0xffffffff ffffffff [6] 0x7e4
- [7] 0x1000000e [8] 0x1fffffff fffffffe
- [9] 0x3000002a5 [10] 0x2018

#### Problem 3

- 1. [1] 31 [2] 0x7e00
  - [3] 0x7dff [4] 0x8001
- 2.0x43f2

sign:0x0 exp:0x21 frac:0x1f2

### Problem 4

- 1. [1] 8 [2] 8
  - [3] 0x550000001040 [4] 0x550000001048
  - [5] 0x550000001050 [6] 0x550000001050
  - [7] 0x550000001050 [8] 0x550000001058
- 2. 32 (8+4+8+1) = 11 Or 4+7=11
- 3. 3 bytes are wasted. Place "char c" before "union u", or "union u" before "int flags".

## Problem 5

- 1 [1] case 35 [2] ret = \*yp
  - [3] case 36 [4] 5
  - [5] .L4 [6] .L8
  - [7] .L3 [8] .L5
- 2 [1] 0x12345688 [2] 0x12345688
  - [3] 0x88775678 [4] 0x0

## Problem 6:

- 1 [1]: Pass y as the first argument to function Q.
  - [2]: Save return value of Q as %rax will be modified by second call to Q in line 10.
- 2 No. Because %r12 is callee saved register, but P does not preserve its old value (unless %rbp in line 2 and line 14 are also changed to %r12).
- 3 No. Because %r11 is caller saved register, so it might be changed by invocation of Q in line 7, however P use it in line 9 without saving its value in line 5.