

H/W #4

p=1

1 IEEE 754 (single precision)

$$1. 1.0 \times 2^{-16} \rightarrow -16 = e - 127$$

$$e = 111$$

$$s = 0$$

$$e = 111 \Rightarrow 0110\ 1111$$

$$f = 000\ 0000\ 0000\ 0000\ 0000\ 0000$$

$$s+e+f$$

$$\begin{array}{ccccccccccccc} 0 & 0110 & 1111 & 000 & 0000 & 0000 & 0000 & 0000 & 0000 \\ \hline 3 & 7 & 8 & 0 & 0 & 0 & 0 & 0 & 0 \\ 37 & 80 & 00 & 00 & & & & & \end{array}$$

$$2. FE\ E8\ 00\ 00 \Rightarrow \begin{array}{ccccccccccccc} 1111 & 1110 & 0110 & 1000 & 0000 & 0000 & 0000 & 0000 \\ \hline 1+4+8+16+32+64+128 & = 253 \end{array}$$

$$s = 1$$

$$e = 253 \Rightarrow 253 - 127 = 126$$

$$\text{value: } -(1.1101)_2 \times 2^{126}$$

3. (double precision)

$$B3\ 0B\ 00\ 00\ 00\ 00\ 00\ 00$$

$$\Rightarrow \begin{array}{ccccccccccccc} 1011 & 0011 & 1101 & 1011 & 0000 & 0000 & 0000 & 0000 & 0000 & 0000 & 0000 & 0000 & 0000 & 0000 \\ \hline 1+4+8+16+32+256+512 & = 829 \end{array}$$

$$s = 1$$

$$e = 829 \rightarrow 829 - 1023 = -194$$

$$f = 1011\ 00\ \dots$$

$$\text{value: } -(1.1011)_2 \times 2^{-194}$$

4. codepoint: U+2243 \Rightarrow UTF-16 = 2243 ($b/k < \text{FFFF}$)

5. UTF-16: 00D6 \rightarrow codepoint: $\underbrace{U+00D6}_{\rightarrow 1101\ 0110} \rightarrow$ UTF-8: 110xxxxx 10xxxxxx

$$\begin{array}{c} = \underbrace{000\ 1101\ 0110}, \quad \rightarrow \underbrace{110\ 000\ 1110\ 0110\ 110} \\ = (3\ 9\ 6) \end{array}$$

\rightarrow

P.2

6. codepoint and UTF-32 the same

UTF-8 → 11110xxx 10xxxxxx 10xxxxxx 10xxxxxx

codepoint: 1F004

make 21

\rightarrow 0001 11110000 0000 0100,

11110000 10011111 10000000 1000100
= F0 9F 80 84

7. codepoint: U+1F648 : glyph (web search) : monkey face

UTF-16: $x = 1F648$

10000

$y = x - 10000 = 1F648 = 11110110 0100 1000,$

11011044 44444444 11011144 44444444
= 11011000 00111101, 11011110, 01001000
= D8 3D DE 48

8. U+2200 → name from UTF-32 & 16 = 00002200, 2200

9. F0 9F 82 DE → 11110000 10011111, 10000010, 10001110,

00000001, 11110000, 10001110
1 P 0 8 E

Codepoint: U+1F08E | UTF-32: 0001F08E

10. UTF-16 → UTF-32: 00000042 | U+0042

11. U+004F → glyph → □

12. codepoint: U+1F611 → glyph: websearch: ☺

UTF-16: $x = 1F611$

$y = x - 10000 = 1F611 = 0000 11110110 0001 0001$

11011044 44444444 11011144 44444444
= 11011000, 00111101, 11011110, 00010001
D8 3D DE 11



p.3

13. ~~U+039C~~: \rightarrow UTF-8: 110xxxxx 10xxxxxx

$\hookrightarrow \underline{1100} \underline{1010} \underline{1001} \underline{1100}$

= $\begin{matrix} 1100 & 1010 & 1001 & 1100 \\ C & E & 9 & C \end{matrix}$

Simple Computer

14. $\begin{matrix} 10000083A \\ \downarrow \\ \text{write out} \end{matrix}$
 $\begin{matrix} & \text{std out} \\ \swarrow & \searrow \\ \text{to a port} & \text{OUT} \end{matrix}$

15. $\begin{matrix} 0020ED9A \\ \downarrow \\ JZ \end{matrix}$
 $\begin{matrix} & \rightarrow \text{lookup} \end{matrix}$

16. $\begin{matrix} SUB \\ \downarrow \\ \text{message} \end{matrix}$
 $\begin{matrix} & \swarrow \\ 510005B9 \end{matrix}$

17. $\begin{matrix} 5020ED9A, \\ \downarrow \\ \text{SUB} \end{matrix}$
 $\begin{matrix} & \downarrow \\ \text{lookup} \end{matrix}$

18. $\begin{matrix} JG7 \\ F \end{matrix}$
 $\begin{matrix} & \text{message} \\ & \downarrow \\ 10005B9 \end{matrix}$