

chapter #6  
chapter #7

4 a) c)  
1, 2, 3 (MAC), 4, 5

**6.4**

$$\begin{array}{r}
 \text{a)} \quad 80 = \begin{array}{c} S \\ 0 \end{array} \begin{array}{c} E \\ 10000101 \end{array} \begin{array}{c} F \\ 0100000 \end{array} \\
 - 26.5 = \begin{array}{c} S \\ 0 \end{array} \begin{array}{c} E \\ 1000011 \end{array} \begin{array}{c} F \\ 1010100 \end{array} \\
 \hline
 \end{array}$$

need to match the exponents, make smaller the same as the larger.

$$\begin{array}{r}
 \begin{array}{c} S \\ 0 \end{array} \begin{array}{c} E \\ 10000101 \end{array} \begin{array}{c} F \\ 0.0100000 \end{array} \\
 \begin{array}{c} S \\ 0 \end{array} \begin{array}{c} E \\ 10000101 \end{array} \begin{array}{c} F \\ -0.0110101 \end{array} \\
 \hline
 \begin{array}{c} S \\ 0 \end{array} \begin{array}{c} E \\ 10000100 \end{array} \begin{array}{c} F \\ 1010110 \end{array}
 \end{array}$$

$$\boxed{0 \ 10000100 \ 1010110} = 53.5_{10}$$

$$\begin{array}{r}
 \text{c)} \quad -8.4 = \begin{array}{c} S \\ 1 \end{array} \begin{array}{c} E \\ 1000010 \end{array} \begin{array}{c} F \\ 0000110 \end{array} \\
 -18.0 = \begin{array}{c} S \\ 0 \end{array} \begin{array}{c} E \\ 1000011 \end{array} \begin{array}{c} F \\ 0010000 \end{array} \\
 \hline
 \end{array}$$

need to match the exponents, make smaller the same as the larger

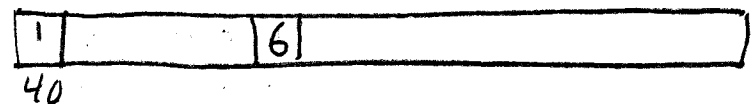
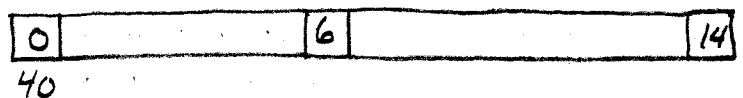
$$\begin{array}{r}
 \begin{array}{c} S \\ 1 \end{array} \begin{array}{c} E \\ 1000011 \end{array} \begin{array}{c} F \\ 0.100011 \end{array} \\
 \begin{array}{c} S \\ 1 \end{array} \begin{array}{c} E \\ 1000011 \end{array} \begin{array}{c} F \\ +1.0010000 \end{array} \\
 \hline
 \begin{array}{c} S \\ 1 \end{array} \begin{array}{c} E \\ 1000011 \end{array} \begin{array}{c} F \\ 1010011 \end{array}
 \end{array}$$

$$\boxed{1 \ 1000011 \ 1010011} = -26.375$$

**7.1**

What is the address of element 6 of a 15-element array that starts at memory location 40 if elements are

- |               |    |
|---------------|----|
| a) characters | 46 |
| b) integers   | 64 |
| c) SP FP      | 64 |
| d) 7 bytes    | 82 |
- 
- |               |    |
|---------------|----|
| a) characters | 45 |
| b) integers   | 60 |
| c) SP FP      | 60 |
| d) 7 bytes    | 75 |



7.2

SAL/MAL start indexing at number 0 so element 26 is the 27th element of the array.

$$54 = \text{base} + 26$$

$$\text{base} = 54 - 26 = \boxed{28}$$

7.3

a) .data  
chars: .byte 0:60

.text

la \$50, chars

add \$50, \$50, 11 # index 12th element

b)

.data  
ints: .word 0:25

.text

la \$50, ints

li \$51, 4 # load size

mul \$51, \$51, 11 # get offset of 12th

add \$50, \$50, \$51 # add base address

7.4

Find byte address of  $[8, 10]$  of a  $12 \times 11$  array of words, stored in row major form.

$$\begin{aligned} M[8, 10] &= BA + \text{SIZE} (\# \text{ of cols} \times r_i + c_i) \\ &= 1000 + 4 (11 \times 8 + 10) \\ &= 1000 + 392 \\ &= 1392 \end{aligned}$$

7.5

Do above for column major form.

$$\begin{aligned} M[8, 10] &= BA + \text{SIZE} (\# \text{ of rows} \times c_i + r_i) \\ &= 1000 + 4 (12 \times 10 + 8) \\ &= 1000 + 512 \\ &= 1512 \end{aligned}$$