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Assignment 1

- [ ] 1.1.3 Section Review, Questions 1,3, 8, 12

1. How do assemblers and linkers work together?

An assembler and a linker work together when the linker takes the files created by the assembler from the high level source code and puts them together into an executable file.

3. What is meant by a *one-to-many relationship* when comparing a high-level language to

machine language?

A single statement in a high-level language expands into many different instructions when it goes down to machine language, in assembly a single instruction converts into a single machine language instruction.

8. Do you suppose type checking on pointer variables is stronger (stricter) in assembly language,

or in C and C++?

Stronger in assembly.

12. *Challenge:* Translate the following C++ expression to assembly language, using the example

presented earlier in this chapter as a guide: X = (Y \* 4) - 3.

mov eax,Y

mov ebx,4

imul ebx

sub eax,3

mov X,eax

- [ ] 1.2.1 Section Review, Questions 2, 3, 10

2. Why do you suppose translated programs often execute more quickly than interpreted ones?

Because a translated program is running directly on the hardware, while an interpreted program has to be translated on the fly.

3. *(True/False):* When an interpreted program written in language L1 runs, each of its instruction

is decoded and executed by a program written in language L0.

True

10. Statements at the assembly language level of a virtual machine are translated into statements at which other level?

The machine language level.

- [ ] 1.3.9 Section Review, Questions 2, 3, 5, 6, 7

2. What is the decimal representation of each of the following unsigned binary integers?

a. 11111000 = 248

b. 11001010 = 128 + 64 + 8 + 2 = 202

c. 11110000 = 128 + 64 + 32 + 16 = 240

3. What is the sum of each pair of binary integers?

a. 00001111 + 00000010 = 15 + 2 = 17

b. 11010101 + 01101011 = 213 + 107 = 320

c. 00001111 + 00001111 = 15 + 15 = 30

5. What is the minimum number of binary bits needed to represent each of the following

unsigned decimal integers?

a. 65 = 7

b. 409 = 9

c. 16385 = 15

6. What is the hexadecimal representation of each of the following binary numbers?

a. 0011 0101 1101 1010 = 3 5 D A

b. 1100 1110 1010 0011 = C E A 3

c. 1111 1110 1101 1011 = F E D B

7. What is the binary representation of the following hexadecimal numbers?

a. A4693FBC = 1010 0100 0110 1001 0011 1111 1011 1100

b. B697C7A1 = 1011 0110 1001 0111 1100 0111 1010 0001

c. 2B3D9461 = 0010 1011 0011 1101 1001 0100 0110 0001

- [ ] 1.7.1 Short Answer, Questions 1-22 and 25

1. In an 8-bit binary number, which is the most significant bit (MSB)?

Bit 7.

2. What is the decimal representation of each of the following unsigned binary integers?

a. 00110101 = 53

b. 10010110 = 150

c. 11001100 = 216

3. What is the sum of each pair of binary integers?

a. 10101111 + 11011011 = 110001010

b. 10010111 + 11111111 = 110010110

c. 01110101 + 10101100 = 100100001

4. Calculate binary 00001101 minus 00000111.

00001101 – 00000111 = 00000100

5. How many bits are used by each of the following data types?

a. word 16 bits

b. doubleword 32 bits

c. quadword 64 bits

d. double quadword 128 bits

6. What is the minimum number of binary bits needed to represent each of the following unsigned decimal integers?

a. 4095 = 12

b. 65534 = 16

c. 42319 = 16

7. What is the hexadecimal representation of each of the following binary numbers?

a. 0011 0101 1101 1010 = 3 5 D A

b. 1100 1110 1010 0011 = C E A 3

c. 1111 1110 1101 1011 = F E D B

8. What is the binary representation of the following hexadecimal numbers?

a. 0126F9D4 = 0000 0001 0010 0110 1111 1001 1101 0100

b. 6ACDFA95 = 0110 1010 1100 1101 1111 1100 1001 0101

c. F69BDC2A = 1111 0110 1001 1011 1101 1100 0010 1010

9. What is the unsigned decimal representation of each of the following hexadecimal integers?

a. 3A = 3 10

b. 1BF = 1 11 15

c. 1001 = 9

10. What is the unsigned decimal representation of each of the following hexadecimal integers?

a. 62 = 6 2

b. 4B3 = 4 11 3

c. 29F = 2 9 15

11. What is the 16-bit hexadecimal representation of each of the following signed decimal integers?

a.-24 = -18

b.-331 = -14B

12. What is the 16-bit hexadecimal representation of each of the following signed decimal integers?

a.-21 = -15

b.-45 = -2D

13. The following 16-bit hexadecimal numbers represent signed integers. Convert each to decimal.

a. 6BF9 =27641

b. C123 = -16093

14. The following 16-bit hexadecimal numbers represent signed integers. Convert each to decimal.

a. 4CD2 = 19666

b. 8230 = -31968

15. What is the decimal representation of each of the following signed binary numbers?

a. 10110101 = -75

b. 00101010 = 42

c. 11110000 = -16

16. What is the decimal representation of each of the following signed binary numbers?

a. 10000000 = -128

b. 11001100 = -52

c. 10110111 = -73

17. What is the 8-bit binary (two’s-complement) representation of each of the following signed decimal integers?

a. -5 = 11111100

b. -42 = 11010101

c. -15 = 11110000

18. What is the 8-bit binary (two’s-complement) representation of each of the following signed decimal integers?

a. -72 = 10110111

b. -98 = 10011101

c. -26 = 11100101

19. What is the sum of each pair of hexadecimal integers?

a. 6B4 + 3FE = AB2

b. A49 + 6BD = 1106

20. What is the sum of each pair of hexadecimal integers?

a. 7C4 + 3BE = B82

b. B69 + 7AD = 1316

21. What are the hexadecimal and decimal representations of the ASCII character capital B?

Hex: 42

Dec: 66

22. What are the hexadecimal and decimal representations of the ASCII character capital G?

Hex: 47

Dec: 71

25. Create a truth table to show all possible inputs and outputs for the boolean function described by ¬(A v B).

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | A v B | ¬(A v B) |
| T | T | T | F |
| T | F | T | F |
| F | T | T | F |
| F | F | F | T |

- [ ] 1.7.2 Algorithm Workbench, Choose any 1 question

1. Write a function that receives a string containing a 16-bit binary integer. The function must return the string’s integer value.

- [ ] EXTRA CREDIT: 1.4.2 Section Review, Questions 1-5 (1 point extra credit per question)