Test Version: 870 **Name:** _____

Multiple Choice - 204 Questions - 20 of 20%

1. Read all the instructions and both sides (back and front) of all pages.
2. Answer the questions you know, first. One Answer Only per question.
3. Manage your time when answering questions on this test!

$2^{10} = 1024$ $2^{12} = 4096$ $2^{16} = 65{,}536$ $16^3 = (2^4)^3$ $16^4 = (2^4)^4$

(Office use only: 87 113 143 162 7 192 40 36 171 121 137 188 16 163 82 156 200 9 181 25 70 34 126 76 153 159 176 136 74 148 172 96 133 32 139 129 147 51 83 158 66 204 150 170 84 62 123 131 73 24 35 33 119 104 140 193 155 27 61 114 17 15 93 46 132 43 44 157 118 89 92 125 86 115 189 168 138 106 42 191 202 2 141 122 151 173 135 30 50 54 194 177 13 6 81 79 185 154 134 184 37 49 179 19 142 63 88 10 161 67 110 117 57 107 182 169 164 75 111 29 149 72 91 112 80 65 174 178 52 45 198 21 53 26 175 127 48 58 77 20 8 116 69 41 59 4 60 31 196 167 1 103 144 100 23 22 105 197 55 71 38 145 120 186 39 166 165 160 28 201 187 99 14 56 108 146 195 78 64 190 102 152 85 90 12 18 68 128 130 183 101 124 199 95 47 203 109 3 94 11 97 5 180 98)

1. Express the binary prefix *tera* as a power of two:
   a. 2^{40} *b.* 2^{30} *c.* 2^{15} *d.* 2^{12} *e.* 2^{20}

2. If you add one (1) to each 10-bit decimal number below, which addition will cause the *carry* flag to be set?
   a. **512** *b.* **511** *c.* **1023**
   d. **1022** *e.* **513**

3. The one's complement of 16-bit **0x1C58** is:
   a. **0x9C59** *b.* **0x9C58** *c.* **0xE3A8**
   d. **0xE3A7** *e.* **0x1C59**

4. What is floating-point underflow?
   a. when the result of adding two numbers together does not fit in the number of bits you have available
   b. when a number becomes very large and exceeds the precision of the significand
   c. when a number becomes very small and gets "too close" to zero to be represented
   d. when you add two positive numbers together and get a negative number
   e. when you add two negative numbers together and get a positive number

5. Which bit does an Arithmetic Right Shift replicate?
   a. least significant bit *b.* sign bit
   c. carry bit *d.* zero bit
   e. overflow bit

6. Which of these values would cause *floating-point underflow* if stored in IEEE-754 single-precision format?
   a. **3.14** × $\mathbf{10^{99}}$ *b.* **3.14** × $\mathbf{10^{-42}}$
   c. **-3.14** × $\mathbf{10^{99}}$ *d.* **3.14** × $\mathbf{10^{42}}$
   e. **-3.14** × $\mathbf{10^{42}}$

7. Calculate the **4**-bit hexadecimal bit-wise operation **Ch & 6h**:
   a. **4h** *b.* **Eh** *c.* **Ah** *d.* **12h** *e.* **18h**

8. ASCII upper-case **Z** is **0x5A**. Which of these is the ASCII code for lower-case **a**?
   a. **0x61** *b.* **0x35** *c.* **0x41**
   d. **0x34** *e.* **0x55**

9. What is the decimal value of the binary exponent in the IEEE 754 single-precision floating-point number **44000000h**?
   a. **127** *b.* **7** *c.* **9** *d.* **8** *e.* **128**

10. If you add one to 12-bit hexadecimal **7FFh**, what hexadecimal number do you get?
    a. **800h** *b.* **100h** *c.* **7FFi**
    d. **1000h** *e.* **7FFg**

11. Simplify the Boolean logic for the following problem specification: "Call PRINT **unless**: the ID is bigger than zero or the SIZE is less than 9."
    a. `if ID > 0 && SIZE < 9 call PRINT`
    b. `if ID >= 0 && SIZE <= 9 call PRINT`
    c. `if ID <= 0 && SIZE >= 9 call PRINT`
    d. `if ID < 0 || SIZE < 9 call PRINT`
    e. `if ID > 0 || SIZE < 9 call PRINT`

12. Which is equivalent to: **(a + b')'**
    a. **a' + b'** *b.* **a' + b** *c.* **a'b**
    d. **ab'** *e.* **a + b''**

13. Convert two's complement **12**-bit **EFCh** to decimal.
    a. **-3837** *b.* **3836** *c.* **-260**
    d. **3837** *e.* **-3836**

14. What is the "working set" of a running program?
    a. maximum number of cache pages that must reside in virtual memory to promote thrashing
    b. the set of CPU instructions that implement cache memory
    c. minimum number of pages that must reside in physical memory to avoid excessive page faults
    d. the set of CPU instructions that implement virtual memory
    e. minimum number of physical pages that must reside in cache memory to hold programs

15. Express in hexadecimal the value stored in memory by:
```
char x = ~0x2
```
    a. **FD hexadecimal** *b.* **FFD hexadecimal**
    c. **FFFD hexadecimal** *d.* **0D hexadecimal**
    e. **D hexadecimal**

16. What are the smallest and largest decimal integers an 8-bit word can hold using an excess-127 (bias-127) representation?
    a. -0 → 2^8-1 *b.* -128 → 128 *c.* -127 → 128
    d. -127 → 127 *e.* -128 → 127

17. Write a simplified expression for the Boolean **complement** of the logic function **F(x,y,z) = xy' + z'**
    a. **x'y + z** *b.* **x' + yz**
    c. **x'z + yz** *d.* **(x' + y) + z**
    e. **z + x'y**

18. Which ASCII character has the smallest numeric value?
    a. **'a'** *b.* **SPACE** *c.* **'0'**
    d. **'A'** *e.* **'9'**

19. When representing integers, the most common method for indicating negative numbers means:
    a. the highest (top-most) bit will always be 1
    b. the lowest (bottom-most) bit will always be 1
    c. the highest (top-most) byte will always be between Ah and Fh
    d. the lowest (bottom-most) byte will always be between Ah and Fh
    e. the lowest (bottom-most) byte will always be between 8h and Fh

20. What is virtual memory "thrashing"?
    a. a lack of cache memory, forcing programs to run in virtual memory
    b. a running program generating an excessive number of page faults
    c. an unexpected (invalid) page fault caused by a large virtual address space
    d. an over-used active part of memory used to store virtual page frames
    e. a lack of swap space, forcing programs to run in physical memory

21. Express **-1** in hexadecimal using 12-bit *sign-magnitude* notation:
    a. **8001 hex** *b.* **801 hex** *c.* **F001 hex**
    d. **101 hex** *e.* **FFFF hex**

22. ASCII upper-case **L** is **0x4C**. Represent this in eight bits using even parity and give the result in hexadecimal:
    a. **0x4D** *b.* **0x04C** *c.* **0xCC**
    d. **0x4C** *e.* **0x14C**

23. In **10**-bit two's complement representation, what decimal number do you get when you add one to decimal **511**:
    a. **-512 decimal** *b.* **0 decimal**
    c. **512 decimal** *d.* **-1,024 decimal**
    e. **-1 decimal**

24. Express decimal **-12** in hexadecimal using 12-bit *sign-magnitude* notation:
    a. **80C hex** *b.* **10B hex** *c.* **112 hex**
    d. **FF4 hex** *e.* **812 hex**

25. What are the smallest and largest decimal integers a 9-bit word can hold using an excess-255 (bias-255) representation?
    a. **-256 → 256** *b.* **-256 → 255** *c.* **-255 → 255**
    d. **-0 → 511** *e.* **-255 → 256**

26. What are the smallest and largest integers a 16-bit word can hold using two's complement representation?
    a. **-32,768 32,768** *b.* **-32,768 32,767**
    c. **0 65,535** *d.* **-32,767 32,767**
    e. **-32,767 32,768**

27. What is the likely final value of variable **z** in this IEEE 754 single-precision pseudo-code fragment:

```
float x = 2^49 + 2
float y = 2^49 + 4
float z = x + y
```

a. **z ← 2^{49} + 2** *b.* **z ← 2^{49}** *c.* **z ← 2^{50}** *d.* **z ← 2^{49} + 6** *e.* **z ← 2^{50} + 6**

28. Perform a one's complement ("~") on hexadecimal **0x01234567**:

a. **0xF1234568** *b.* **0x81234567** *c.* **0xFEDCBA98** *d.* **0xFEDCBA99** *e.* **0xF1234567**

29. Express decimal **-10** in hexadecimal using 12-bit *sign-magnitude* notation:

a. **F0A hex** *b.* **410 hex** *c.* **10A hex** *d.* **110 hex** *e.* **80A hex**

30. What are the smallest and largest decimal integers a **7**-bit word can hold using an excess-63 (bias-63) representation?

a. **-64, +63** *b.* **-0, +128** *c.* **-64, +64** *d.* **-63, +64** *e.* **+0, +128**

31. What is the decimal value of the binary exponent in the IEEE 754 single-precision floating-point number **44800000h**?

a. **10 decimal** *b.* **127 decimal** *c.* **128 decimal** *d.* **9 decimal** *e.* **8 decimal**

32. How many Kilo (K) are in a Giga (G)?

a. one billion (one thousand million)
b. one hundred
c. one thousand
d. ten
e. one million

33. In 8-bit two's complement representation, which hexadecimal number below is numerically larger than hexadecimal **DDh**:

a. **10 hexadecimal** *b.* **C0 hexadecimal** *c.* **80 hexadecimal** *d.* **A0 hexadecimal** *e.* **90 hexadecimal**

34. ASCII letter **'x'** has hex code **78h**. What is the hex code for CTRL-X?

a. **28 hexadecimal** *b.* **08 hexadecimal** *c.* **58 hexadecimal** *d.* **38 hexadecimal** *e.* **18 hexadecimal**

35. The IEEE 754 floating-point number 00000000h is positive. Give the hexadecimal for the same number, only negative.

a. **1FFFFFFFh** *b.* **8FFFFFFFh** *c.* **10000000h** *d.* **FFFFFFFFh** *e.* **80000000h**

36. In 12-bit two's complement representation, what decimal number do you get when you add one to decimal **2,047**:

a. **2,048 decimal** *b.* **-1 decimal** *c.* **-2,047 decimal** *d.* **0 decimal** *e.* **-2,048 decimal**

37. Use a bit-flip table to convert 64-bit hexadecimal **0x0123456789ABCDEF** to its one's complement form:

a. **0xFEDCBA9876543211** *b.* **0x00123456789ABCDE** *c.* **0x123456789ABCDEF0** *d.* **0x0FEDCBA987654321** *e.* **0xFEDCBA9876543210**

38. Convert 95 decimal to hexadecimal (base 16):

a. **145 hex** *b.* **5F hex** *c.* **515 hex** *d.* **5E hex** *e.* **514 hex**

39. Express in hexadecimal the value stored in memory by:

```
char x = ~0x4
```

a. **FFFB hexadecimal** *b.* **F4 hexadecimal** *c.* **0B hexadecimal** *d.* **B hexadecimal** *e.* **FB hexadecimal**

40. What are the smallest and largest decimal integers an 8-bit word can hold using an unsigned representation?

a. $0 \rightarrow 256$ *b.* $128 \rightarrow 255$ *c.* $0 \rightarrow 2^{(8-1)}$ *d.* $256 \rightarrow 511$ *e.* $0 \rightarrow 255$

41. Convert unsigned octal (base 8) **127** to decimal:

a. **87** *b.* **88** *c.* **99** *d.* **97** *e.* **98**

42. Write the simplest IF statement (simplify the Boolean logic) for the following programming problem specification: *Call the ADD routine unless: the* **sum** *is more than* **zero** *or the* **cost** *is less than* **five**.

a. `IF (NOT sum) <= 0 OR (NOT cost) >= 5 DO ADD()`
b. `IF sum >= 0 OR cost <= 5 DO ADD()`
c. `IF sum <= 0 AND cost >= 5 DO ADD()`
d. `IF sum < 0 AND cost > 5 DO ADD()`
e. `IF sum > 0 OR cost < 5 DO ADD()`

43. What are the smallest and largest decimal integers a 16-bit word can hold using two's complement representation?

a. **-32,767 → 32,768** *b.* **-32,767 → 32,767**
c. **-32,768 → 32,768** *d.* **-0 → 65,535**
e. **-32,768 → 32,767**

44. What is the decimal value of the 8-bit excess-127 exponent in the IEEE 754 single-precision floating-point number **C400FFFFh**?

a. **-12** *b.* **-5** *c.* **-9** *d.* **9** *e.* **-4**

45. Express in hexadecimal the value stored in memory by:

```
char x = ~0xA
```

a. **FFF6 hexadecimal** *b.* **F6 hexadecimal**
c. **5 hexadecimal** *d.* **05 hexadecimal**
e. **F5 hexadecimal**

46. Convert the two's complement representation 16-bit hexadecimal number **EFF6** to decimal.

a. 61430 decimal *b.* 1009 decimal *c.* -4105 decimal
d. -4106 decimal *e.* -1010 decimal

47. If you add one to 16-bit hexadecimal **7FFFh**, what hexadecimal number do you get?

a. **7FF0h** *b.* **7F00h** *c.* **8000h**
d. **7000h** *e.* **7FFGh**

48. In 16-bit two's complement representation, which hexadecimal number below is numerically larger than hexadecimal **E000h**:

a. **A000 hex** *b.* **9000 hex** *c.* **D000 hex**
d. **8000 hex** *e.* **0000 hex**

49. Express **-2** in hexadecimal using 8-bit *sign-magnitude* notation:

a. **82** *b.* **12** *c.* **FFE**
d. **FE** *e.* **10000010**

50. What is the "working set" of a running program?

a. minimum number of pages that must reside in physical memory to avoid excessive page faults
b. the set of CPU instructions that implement virtual memory
c. the set of CPU instructions that implement cache memory
d. maximum number of cache pages that must reside in virtual memory to promote thrashing
e. minimum number of physical pages that must reside in cache memory to hold programs

51. ASCII upper-case **Z** is **0x5A**. Represent this in eight bits using odd parity and give the result in hexadecimal:

a. **0x5A** *b.* **0x15A** *c.* **0x05A**
d. **0xDA** *e.* **0x5B**

52. ASCII upper-case **I** is **0x49**. Which of these is the ASCII code for lower-case **j**?

a. **0x7C** *b.* **0x50** *c.* **0x70**
d. **0x82** *e.* **0x6A**

53. If you add one (1) to each 9-bit decimal number below, which addition will cause the *carry* flag to be set?

a. **256** *b.* **510** *c.* **255** *d.* **511** *e.* **257**

54. How many different bit patterns (numbers) can be represented with 9 bits?

a. **512 patterns** *b.* **18 patterns**
c. **511 patterns** *d.* **1024 patterns**
e. **256 patterns**

55. The IEEE 754 model for single precision floating point has:

a. one sign bit, a five bit exponent, and an 8 bit significand
b. one sign bit, an eleven bit exponent, and a 52 bit significand
c. one sign bit, an eleven bit exponent, and a 23 bit siginificand
d. one sign bit, an eight bit exponent, and a 52 bit significand
e. one sign bit, an eight bit exponent, and a 23 bit significand

56. Which one (1) of the IEEE 754 floating-point numbers below is negative?
a. **12345678h** *b.* **48000000h** *c.* **88000000h**
d. **01000000h** *e.* **77FFFFFFh**

57. What are the smallest and largest decimal integers an 8-bit word can hold using a sign/magnitude representation?
a. -128 → 127 *b.* -0 → 255 *c.* -255 → 255
d. -0 → 2^8-1 *e.* -127 → 127

58. **1,000,000** decimal is **F4240h** in hexadecimal. Without converting, what is the decimal value of **F42400h**?
a. **8,000,000 decimal** *b.* **4,000,000 decimal**
c. **500,000 decimal** *d.* **16,000,000 decimal**
e. **250,000 decimal**

59. Convert the two's complement representation 12-bit hexadecimal number **FFAh** to decimal.
a. -6 decimal *b.* 4090 decimal
c. -151510 decimal *d.* -5 decimal
e. -4091 decimal

60. If you add one (1) to each 10-bit decimal number below, which addition will cause the *overflow* flag to be set?
a. **513** *b.* **512** *c.* **1022**
d. **511** *e.* **1023**

61. The following hexadecimal memory dump contains one little-endian two-byte two's-complement integer starting at address **11A**. Give the value in decimal.

```
ADDR: ---------- HEX MEMORY BYTES ------------------
 100: EB 3C 90 4D 53 44 4F 53-35 2E EF FF 02 04 01 00
 110: 02 00 04 00 00 F8 F6 00-13 00 FE FF 11 00 00 00
```

a. **65279** *b.* **65534** *c.* **-2**
d. **-65534** *e.* **-65279**

62. What are the smallest and largest decimal integers a **7**-bit word can hold using an excess-63 (bias-63) representation?
a. **-64, +63** *b.* **-64, +64** *c.* **+0, +128**
d. **-63, +64** *e.* **-0, +128**

63. How do the ASCII character set and the Unicode character set relate to each other?
a. The first 128 characters of Unicode are ASCII, but in 16-bit form.
b. The first 256 characters of Unicode are ASCII, but in 16-bit form.
c. The first 512 characters of Unicode are ASCII, but in 16-bit form.
d. The first 256 characters of Unicode are identical to ASCII.
e. The first 128 characters of Unicode are identical to ASCII.

64. Choose the *variable-length* character set where not all characters are represented using the same number of bytes:
a. ISO-8859-1 (Latin-1) *b.* ASCII
c. EBCDIC *d.* UTF-8
e. UNICODE

65. In 8-bit two's complement representation, what decimal number do you get when you add one to decimal **127**:
a. **-128 decimal** *b.* **-1 decimal**
c. **0 decimal** *d.* **-127 decimal**
e. **128 decimal**

66. Choose an *absolute* URL syntax:
a. **href="philosophy/index.html"**
b. **href="index.html"**
c. **href="http://www.gnu.org/"**
d. **href="../index.html"**
e. **href="../../index.html"**

67. Choose an ASCII digit **0** stored in 8 bits with *odd* parity:
a. **0xB0** *b.* **0x80** *c.* **0xC1**
d. **0x30** *e.* **0x00**

68. What are the smallest and largest decimal integers an 8-bit word can hold using an unsigned representation?
a. 0 → 16 *b.* 0 → 255 *c.* -128 → 128
d. 0 → 256 *e.* -128 → 127

69. If you add one (1) to each 8-bit decimal number below, which addition will cause the *overflow* flag to be set?
a. **129** *b.* **255** *c.* **128** *d.* **254** *e.* **127**

70. Given two megabytes (2 MiB commonly written as 2 MB) of byte-addressable memory, what are the lowest and highest memory addresses?

a. **0 to 2^{22}-1** *b.* **0 to 2^{21}-1** *c.* **0 to 2^{20}**
d. **0 to 2^{20}-1** *e.* **0 to 2^{21}**

71. How do the ASCII character set and the UTF-8 character set relate to each other?

a. The first 128 characters of UTF-8 are ASCII, but in 16-bit form.
b. The first 128 characters of UTF-8 are identical to ASCII.
c. The first 256 characters of UTF-8 are identical to ASCII.
d. The first 256 characters of UTF-8 are ASCII, but in 16-bit form.
e. The first 512 characters of UTF-8 are ASCII, but in 16-bit form.

72. If you store the ASCII character string **ABCD** in memory, with **0x41** at the lowest/smallest memory location, then you know:

a. nothing - byte order doesn't apply to ASCII
b. the machine is using UNICODE byte order
c. the machine is using Big Endian byte order
d. the machine is using Little Endian byte order
e. the machine is using IEEE 754 byte order

73. Express the IPv4 address **127.0.0.1** in hexadecimal in Internet byte order:

a. **01 00 00 7F** *b.* **F7 00 00 10**
c. **7F 00 00 01** *d.* **10 00 00 F7**
e. **00 10 F7 00**

74. If you add one (1) to each 7-bit decimal number below, which addition will cause the *carry* flag to be set?

a. **127** *b.* **64** *c.* **65** *d.* **63** *e.* **126**

75. Which is equivalent to: **(a' + b)'**

a. **ab'** *b.* **a' + b'** *c.* **a + b'**
d. **a'' + b'** *e.* **a'b**

76. What is the basic feature that Virtual Memory enables?

a. the computer can execute programs larger than physical memory
b. programs run faster due to in-memory caching of physical memory
c. virtual addresses are usually smaller than physical addresses
d. using thrashing, the CPU can execute more than one program at once
e. the CPU can have more than one level of physical memory cache

77. The *Internet Robustness Principle* states:

a. Always separate the presentation of a web page from the content.
b. Web sites should be viewable in any browser.
c. Always send the Big End (byte) of a number first over the Internet.
d. Be conservative in what you accept, and liberal in what you send.
e. Be liberal in what you accept, and conservative in what you send.

78. If a CPU has a clock frequency of 2 GHz, how long does one access cycle take?

a. **0.5 ns** *b.* **1 ns** *c.* **2 ms**
d. **1 ms** *e.* **0.5 ms**

79. Calculate the **4**-bit hexadecimal bit-wise operation **Ch | 6h**:

a. **Ah** *b.* **Eh** *c.* **18h** *d.* **12h** *e.* **4h**

80. Which is equivalent to: **(ab)'**

a. **ab'** *b.* **a' + b'** *c.* **a'b**
d. **a'b'** *e.* **a + b**

81. Write the simplest IF statement (Boolean logic) for the following programming problem specification: *Call the ADD routine if* **sorted** *is TRUE, or if* **empty** *is TRUE, but not if both are TRUE ("eXclusive-OR").*

a. IF (sorted AND NOT empty) OR (empty AND NOT sorted) DO ADD()
b. IF (sorted AND empty) AND (sorted OR empty) DO ADD()
c. IF (NOT sorted OR empty) OR (NOT sorted AND empty) DO ADD()
d. IF (sorted OR empty) OR (sorted AND empty) DO ADD()
e. IF (sorted OR NOT empty) AND (NOT sorted OR empty) DO ADD()

82. What is floating-point underflow?

a. when you add two positive numbers together and get a negative number
b. when a number becomes very large and exceeds the precision of the significand
c. when a number becomes very small and gets "too close" to zero to be represented
d. when the result of adding two numbers together does not fit in the number of bits you have available
e. when you add two negative numbers together and get a positive number

83. The following hexadecimal memory dump contains one little-endian two-byte two's-complement integer starting at address **11A**. Give the value in decimal.

```
ADDR: ---------- HEX MEMORY BYTES ------------------
 100: EB 3C 90 4D 53 44 4F 53-35 2E EF FF 02 04 01 00
 110: 02 00 04 00 00 F8 F6 00-13 00 FE FF 11 00 00 00
```

a. **-65279** *b.* **-65534** *c.* **65534**
d. **-2** *e.* **65279**

84. If you add one to 16-bit hexadecimal **7FFF**, what hexadecimal number do you get?

a. **7FFG hex** *b.* **7000 hex** *c.* **7FF0 hex**
d. **7F00 hex** *e.* **8000 hex**

85. What are the smallest and largest decimal integers a 16-bit word can hold using two's complement representation?

a. **-32,768 32,767** *b.* **-32,767 32,767**
c. **-32,767 32,768** *d.* **-65,536 65,535**
e. **-65,535 65,535**

86. What is the decimal value of the binary exponent in the IEEE 754 single-precision floating-point number **C4800000h**?

a. **10 decimal** *b.* **8 decimal**
c. **127 decimal** *d.* **9 decimal**
e. **128 decimal**

87. Normalize the binary number **110.011**:

a. 11001.1×2^{-4} *b.* 11001.1×2^{4}
c. 1.10011×2^{2} *d.* 1.10011×2^{-2}
e. 1.111×2^{-2}

88. A "page fault" happens when:

a. physical memory addresses are smaller than virtual memory
b. a process accesses a physical address that is not stored in the cache
c. a cache hit forces a physical page frame into virtual memory
d. virtual memory addresses are smaller than physical memory
e. a process accesses a virtual address that is not mapped to physical memory

89. Convert 91 decimal to hexadecimal (base 16):

a. **511 hex** *b.* **145 hex** *c.* **5B hex**
d. **133 hex** *e.* **91 hex**

90. Convert decimal **73** to octal (base 8):

a. **109** *b.* **111** *c.* **19** *d.* **49** *e.* **119**

91. Which sum fits in IEEE 754 single-precision floating point with no loss of range or precision?

a. $2^{128} + 2^{129}$ *b.* $2^{20} + 2^{100}$ *c.* $2^{50} + 2^{100}$
d. $2^{60} + 2^{100}$ *e.* $2^{105} + 2^{124}$

92. What is the likely final value of variable **z** in this IEEE 754 single-precision pseudo-code fragment:

```
float x = 2^50 + 5
float y = 2^50 + 3
float z = x + y
```

a. $z \leftarrow 2^{50} + 8$ *b.* $z \leftarrow 2^{50} + 2$
c. $z \leftarrow 2^{51} + 8$ *d.* $z \leftarrow 2^{50}$
e. $z \leftarrow 2^{51}$

93. Express **-11** decimal in hexadecimal using **8**-bit sign-magnitude notation.

a. **F5h** *b.* **1Bh** *c.* **8Bh** *d.* **8Ah** *e.* **FBh**

94. How do the ASCII character set and the Unicode character set relate to each other?

a. The first 512 characters of Unicode are ASCII, but in 16-bit form.
b. The first 256 characters of Unicode are ASCII, but in 16-bit form.
c. The first 256 characters of Unicode are identical to ASCII.
d. The first 128 characters of Unicode are ASCII, but in 16-bit form.
e. The first 128 characters of Unicode are identical to ASCII.

95. Express in hexadecimal the value stored in memory by the expression:

```
char x = 0x28 | 0xAA
```

a. **2A hexadecimal** *b.* **28AA hexadecimal**
c. **28 hexadecimal** *d.* **D2 hexadecimal**
e. **AA hexadecimal**

96. Express in hex the value stored in memory by:

```
char x = 0xA5 | 0x5B
```

a. **FF hexadecimal** *b.* **A5 hexadecimal**
c. **A55B hexadecimal** *d.* **166 hexadecimal**
e. **00 hexadecimal**

97. Which C-language expression below will turn an ASCII letter into its associated control (CTRL) character?

a. `char ctrl = letter + 0x5;`
b. `char ctrl = letter | 0x5;`
c. `char ctrl = letter & 0x5;`
d. `char ctrl = letter | 0x1F;`
e. `char ctrl = letter & 0x1F;`

98. What are the smallest and largest decimal integers an 11-bit word can hold using a one's complement representation?

a. `-1024` → `1023`
b. `-1023` → `1023`
c. `-0` → `1023`
d. `-2047` → `2047`
e. `-0` → `2047`

99. In 8-bit two's complement representation, which number below is the next numerically larger value greater than **`DDh`**:

a. `99h` *b.* `88h` *c.* `11h` *d.* `CCh` *e.* `AAh`

100. Which Boolean expression is equivalent to: `(ab)'`

a. `a'b'` *b.* `a'b` *c.* `a + b`
d. `a' + b'` *e.* `ab'`

101. Apply deMorgan to: `(ab')'`

a. `a' + b'` *b.* `a + b'` *c.* `a' + b`
d. `a'b` *e.* `a'b''`

102. Convert 80 decimal to octal (base 8):

a. `100 octal` *b.* `50 octal` *c.* `110 octal`
d. `120 octal` *e.* `10 octal`

103. What is virtual memory "thrashing"?

a. a running program generating an excessive number of page faults
b. a lack of swap space, forcing programs to run in physical memory
c. an unexpected (invalid) page fault caused by a large virtual address space
d. an over-used active part of memory used to store virtual page frames
e. a lack of cache memory, forcing programs to run in virtual memory

104. Calculate the **`4`**-bit hexadecimal bit-wise operation **`Ch | 6h`**:

a. `18h` *b.* `Eh` *c.* `Ah` *d.* `4h` *e.* `12h`

105. The largest IP datagram that can be sent on the Internet is approximately 65,535 bytes. How many bits are needed to hold this unsigned length field in the IP header?

a. 15 *b.* 64 *c.* 16 *d.* 32 *e.* 65

106. Convert two's complement **`12`**-bit **`EFCh`** to decimal.

a. `-260` *b.* `-3837` *c.* `-3836`
d. `3836` *e.* `3837`

107. Express the simplified Boolean *complement* of this Boolean expression:

`F(x,y,z) = ( x' + y )z'`

a. `z + y'x`
b. `x' + yz'`
c. `( y' + x )z`
d. `z' + yx'`
e. `x + y' + z`

108. Simplify the Boolean logic for the following problem specification: "Call PRINT **unless**: the ID is bigger than zero or the SIZE is less than 9."

a. `if ID <= 0 && SIZE >= 9 call PRINT`
b. `if ID >= 0 && SIZE <= 9 call PRINT`
c. `if ID > 0 || SIZE < 9 call PRINT`
d. `if ID > 0 && SIZE < 9 call PRINT`
e. `if ID < 0 || SIZE < 9 call PRINT`

109. What are the smallest and largest integers an 8-bit word can hold using an unsigned representation?

a. `-128 127` *b.* `0 256` *c.* `0 255`
d. `0 16` *e.* `-128 128`

110. Convert unsigned octal (base 8) **`177`** to decimal:

a. -1 decimal *b.* 128 decimal *c.* 255 decimal
d. 127 decimal *e.* 256 decimal

111. If a memory has an access time of **`5ns`**, how many accesses can you make in one second?

a. `200 MHz` *b.* `500 MHz` *c.* `50 MHz`
d. `100 MHz` *e.* `20 MHz`

112. If you add one (1) to each 8-bit decimal number below, which addition will cause the *carry* flag to be set?

a. `127` *b.* `255` *c.* `128` *d.* `254` *e.* `129`

113. Convert the decimal number **26** to octal:
a. **32 octal** *b.* **38 octal** *c.* **26 octal**
d. **22 octal** *e.* **1A octal**

114. If a machine stores a 32-bit integer **0x41424344** in memory with **0x41** at the lowest/smallest memory location, then you know:
a. the machine is using Big Endian byte order
b. nothing - byte order doesn't apply to 32-bit integers
c. the machine is using ASCII byte order
d. the machine is using Little Endian byte order
e. the machine is using IEEE 754 byte order

115. When storing multi-byte integers, *little-endian* hardware:
a. stores the littlest byte at the largest memory address
b. stores the most significant byte at the lowest memory address
c. stores the highest byte at the littlest memory address
d. stores the least significant byte at the lowest memory address
e. stores the least significant byte at the highest memory address

116. What is the decimal value of the 8-bit excess-127 exponent in the IEEE 754 single-precision floating-point number **C2000000h**?
a. **4** *b.* **9** *c.* **2** *d.* **132** *e.* **5**

117. What is the (approximate) largest value you can store safely in 32-bit IEEE-754 single-precision format?
a. 10^{-38} *b.* 10^{32} *c.* 10^{127}
d. 10^{128} *e.* 10^{38}

118. Express decimal **-12** in hexadecimal using 12-bit *sign-magnitude* notation:
a. **10B hex** *b.* **80C hex** *c.* **112 hex**
d. **F0B hex** *e.* **812 hex**

119. If the 32-bit hexadecimal number **0x44332211** is stored in memory on a big-endian computer, what value is stored in the lowest address memory byte location?
a. **4** *b.* **1** *c.* **22** *d.* **44** *e.* **11**

120. A *Page Fault* means that the memory or data reference:
a. had a faulty (invalid) memory checksum
b. did not match the Endian-ness of the hardware
c. was found in physical memory
d. had a faulty (invalid) page number
e. was not found in physical memory

121. What are the smallest and largest decimal integers a 10-bit word can hold using an unsigned representation?
a. **-512 → 511** *b.* **0 → 1023** *c.* **0 → 511**
d. **0 → 1024** *e.* $0 \rightarrow 2^{(10-1)}$

122. Express **-11** decimal in hexadecimal using **8**-bit sign-magnitude notation.
a. **8Bh** *b.* **1Bh** *c.* **8Ah** *d.* **FBh** *e.* **F5h**

123. Here is one line (16 bytes) of a hexadecimal memory dump:
4C 69 6E 75 78 0D 0A 52 6F 63 6B 73 5C 21 0D 0A
Under what operating system was the above text file created?
a. Microsoft Windows/DOS *b.* IBM Mainframe (EBCDIC)
c. World of Warcraft *d.* Macintosh
e. Unix/Linux

124. If the number **0x12345678** is stored in memory on a little-endian computer, what value is stored in the lowest memory byte location?
a. **8** *b.* **78** *c.* **1** *d.* **12** *e.* **123**

125. Express in hex the value stored in memory by:
```
char x = 0xAA | 0x77
```
a. **121 hexadecimal** *b.* **AA hexadecimal**
c. **77 hexadecimal** *d.* **FF hexadecimal**
e. **AA77 hexadecimal**

126. Convert unsigned octal (base 8) **100** to decimal:
a. 512 decimal *b.* 256 decimal *c.* 16 decimal
d. 128 decimal *e.* 64 decimal

127. What is the likely final value of variable **z** in this IEEE 754 single-precision pseudo-code fragment:

```
float x = 10^30
float y = x + 3
float z = (x - y) - 3
```

a. **z ← 10^30 - 6** *b.* **z ← -6**
c. **z ← 0** *d.* **z ← -3**
e. **z ← 10^30**

128. What is the standards group responsible for the Internet standards?
a. Internet Engineering Task Force (IETF)
b. Institute of Electrical and Electronic Engineers (IEEE)
c. International Organization for Standardization (ISO)
d. International Telecommunications Union (ITU)
e. World Wide Web Consortium (W3C)

129. Convert decimal **0.3125** to binary:
a. **0.1100** *b.* **0.0011** *c.* **0.0101**
d. **0.0110** *e.* **0.1010**

130. Choose an ASCII letter **A** stored in 8 bits with *odd* parity:
a. **0x0A** *b.* **0x61** *c.* **0x41**
d. **0x8A** *e.* **0xC1**

131. Without converting, which value sum fits in IEEE 754 single-precision floating-point with no loss of range or precision:
a. **2^29 + 2^10 + 2^9 + 2^0** *b.* **2^29 + 2^28 + 2^2 + 2^1**
c. **2^27 + 2^23 + 2^1** *d.* **2^26 + 2^0**
e. **2^29 + 2^28 + 2^27 + 2^26**

132. The IEEE 754 floating-point number 00000000h is positive. Give the hexadecimal for the same number, only negative.
a. **10000000h** *b.* **80000000h** *c.* **1FFFFFFFh**
d. **FFFFFFFFh** *e.* **8FFFFFFFh**

133. Convert decimal **173.5625** into hexadecimal:
a. **1013.1010** *b.* **1013.0101** *c.* **AD.9**
d. **1013.5** *e.* **AD.1001**

134. A "page fault" happens when:
a. a cache hit forces a physical page frame into virtual memory
b. a process accesses a physical address that is not stored in the cache
c. a process accesses a virtual address that is not mapped to physical memory
d. physical memory addresses are smaller than virtual memory
e. virtual memory addresses are smaller than physical memory

135. What is the likely final value of variable **z** in this IEEE 754 single-precision pseudo-code fragment:

```
float x = 2^29
float y = x + 3
float z = x - y
```

a. **z ← -3** *b.* **z ← 2^29**
c. **z ← 2^29 + 3** *d.* **z ← 3**
e. **z ← 0**

136. In **11**-bit two's complement representation, what decimal number do you get when you add one to decimal **1,023**:
a. **-1 decimal** *b.* **1,024 decimal**
c. **-2,048 decimal** *d.* **-1,024 decimal**
e. **0 decimal**

137. Convert 46 decimal to octal (base 8):
a. **106 octal** *b.* **56 octal** *c.* **2E octal**
d. **38 octal** *e.* **46 octal**

138. Convert the following dotted-quad IP address to 32-bit hexadecimal in Internet byte order: **160.16.32.1**
a. **16016321h** *b.* **A0102001h** *c.* **012010A0h**
d. **13216160h** *e.* **1002010Ah**

139. Express floating-point **314.12345** as a normalized decimal number using scientific notation with four digits of precision:
a. **0.3141e3** *b.* **3141e2** *c.* **3.141e-2**
d. **3.141e2** *e.* **3141.0e-2**

140. Calculate the **4**-bit hexadecimal bit-wise operation **Ch ^ 6h**:
a. **Eh** *b.* **18h** *c.* **12h** *d.* **4h** *e.* **Ah**

141. What is the approximate largest number you can store in IEEE 754 single-precision floating point?
a. **1.0^{38}** *b.* **2^{38}** *c.* **1.0^{127}**
d. **10^{38}** *e.* **10^{127}**

142. If you add one (1) to each 7-bit decimal number below, which addition will cause the *overflow* flag to be set?
a. **126** *b.* **63** *c.* **65** *d.* **127** *e.* **64**

143. Encode ASCII **'A'** as odd parity:
a. **0Ah** *b.* **C1h** *c.* **61h** *d.* **E1h** *e.* **41h**

144. Calculate the **4**-bit hexadecimal bit-wise operation **Ch ^ 6h**:
a. **Eh** *b.* **Ah** *c.* **4h** *d.* **12h** *e.* **18h**

145. Convert the two's complement representation 12-bit hexadecimal number **EF6h** to decimal.
a. -266 decimal *b.* 10A decimal *c.* 109 decimal
d. 3830 decimal *e.* -265 decimal

146. Which sum fits in IEEE 754 single-precision floating point with no loss of range or precision?
a. **$2^{100} + 2^{50}$** *b.* **$2^{100} + 2^{70}$** *c.* **$2^{129} + 2^{128}$**
d. **$2^{100} + 2^{60}$** *e.* **$2^{120} + 2^{100}$**

147. Convert the two's complement representation 12-bit hexadecimal number **FE9h** to decimal.
a. 4073 decimal *b.* -23 decimal
c. -22 decimal *d.* 4294963223 decimal
e. -17 decimal

148. ASCII letter **'w'** has hex code **77h**. What is the hex code for CTRL-W?
a. **57 hexadecimal** *b.* **17 hexadecimal**
c. **37 hexadecimal** *d.* **27 hexadecimal**
e. **07 hexadecimal**

149. Why doesn't the number 1.5×10^{50} fit accurately in an IEEE 754 single precision floating-point number?
a. the fraction 0.5 cannot be represented accurately in binary
b. the value exceeds the range of the available exponent
c. IEEE 754 can only store binary numbers, not decimal
d. the value causes floating-point underflow
e. the value exceeds the precision of the significand

150. What is the approximate ratio of access speed between main memory and hard disk? Hard disk access is (appproximately):
a. nine orders of magnitude slower than memory access
b. four orders of magnitude slower than memory access
c. two orders of magnitude slower than memory access
d. three orders of magnitude slower than memory access
e. six orders of magnitude slower than memory access

151. In **11**-bit two's complement representation, what decimal number do you get when you add one to decimal **1,023**:
a. **-2,048 decimal** *b.* **1,024 decimal**
c. **-1 decimal** *d.* **-1,024 decimal**
e. **0 decimal**

152. How many different bit patterns (numbers) can be represented with 13 bits?
a. **26 patterns** *b.* **16,382 patterns**
c. **8,192 patterns** *d.* **4,096 patterns**
e. **2,048 patterns**

153. The one's complement of 16-bit **C158h** (hexadecimal) is:
a. **C159** *b.* **3EA7** *c.* **3EA8**
d. **C157** *e.* **4158**

154. How many bits are required to represent a single hexadecimal digit?
a. **6** *b.* **32** *c.* **4** *d.* **2** *e.* **16**

155. If a CPU has a clock frequency of **50 MHz**, how long does one access cycle take?
a. **500 ns** *b.* **50 ns** *c.* **20 ns**
d. **10 ns** *e.* **100 ns**

156. If a memory has an access time of **5ns**, how many accesses can you make in one second?
a. **100 MHz** *b.* **20 MHz** *c.* **200 MHz**
d. **500 MHz** *e.* **50 MHz**

157. If a CPU has a clock frequency of **50 MHz**, how long does one access cycle take?
a. **10 ns** *b.* **20 ns** *c.* **500 ns**
d. **50 ns** *e.* **100 ns**

158. Why doesn't the number 33.25×10^{39} fit accurately in an IEEE 754 single precision floating-point number?
a. the value exceeds the precision of the significand
b. the value exceeds the range of the available exponent
c. the value causes floating-point underflow
d. IEEE 754 can only store binary numbers, not decimal
e. the mantissa 33.25 cannot be represented accurately in binary

159. Convert decimal **79** to hexadecimal (base 16):
a. **4F** *b.* **414** *c.* **145** *d.* **4E** *e.* **415**

160. Express **-1** in hexadecimal using 16-bit *sign-magnitude* notation:
a. **F001 hex** *b.* **4001 hex** *c.* **8001 hex**
d. **FFFF hex** *e.* **1001 hex**

161. Apply deMorgan to: **(x' + y)'**
a. **x + y'** *b.* **x'y'** *c.* **xy'**
d. **x'y** *e.* **x'' + y'**

162. The one's complement of binary **10101100** is:
a. **01010100** *b.* **00101101** *c.* **00101100**
d. **10101101** *e.* **01010011**

163. If you add one (1) to each 9-bit decimal number below, which addition will cause the *overflow* flag to be set?
a. **257** *b.* **256** *c.* **255** *d.* **510** *e.* **511**

164. Which C-language expression below will turn an ASCII letter into its associated control (CTRL) character?
a. `char ctrl = letter & 0x5;`
b. `char ctrl = letter | 0x5;`
c. `char ctrl = letter | 0x60;`
d. `char ctrl = letter | 0x1F;`
e. `char ctrl = letter & 0x1F;`

165. Approximately how many more ordinary memory accesses (in decimal orders of magnitude) could a CPU perform in the time it takes to handle a single page fault?
a. about ten orders of magnitude
b. about six orders of magnitude
c. about one order of magnitude
d. about two orders of magnitude
e. about three orders of magnitude

166. What is the approximate ratio of access speed between main memory and hard disk? Hard disk access is (appproximately):
a. one hundred times slower than memory access
b. one thousand times slower than memory access
c. one million times slower than memory access
d. one trillion times slower than memory access
e. one billion times slower than memory access

167. What is the 12-bit sum of these 12-bit hexadecimal numbers: **ABC** plus **DEF**:
a. **579 hex** *b.* **2577 hex** *c.* **577 hex**
d. **8AB hex** *e.* **79B hex**

168. What are the smallest and largest integers a 9-bit word can hold using an unsigned representation?
a. **0 512** *b.* **-256 256** *c.* **0 511**
d. **-256 255** *e.* **0 18**

169. A *Cache Hit* means that the memory or data reference:
a. was slowed down due to being found in the cache
b. contributed to process thrashing
c. was found in the cache
d. hit a vonNeumann bottleneck performance slowdown
e. was not found in the cache

170. Write a simplified expression for the Boolean complement of the logic function **F(x,y,z) = (x + y')(z')**

a. **z + x'y** *b.* **x + y'z'** *c.* **xz' + y'z'**
d. **xy' + z'** *e.* **zx' + y**

171. Which bit does an Arithmetic Right Shift replicate?

a. sign bit *b.* least significant bit
c. carry bit *d.* overflow bit
e. zero bit

172. How many bits are needed to hold a number that ranges from 0 to 32,000?

a. **15** *b.* **16** *c.* **14** *d.* **17** *e.* **32**

173. Express the IPv4 address **127.0.0.1** in hexadecimal in Intel hardware byte order:

a. **F7 00 00 10** *b.* **10 00 00 F7**
c. **7F 00 00 01** *d.* **01 00 00 7F**
e. **00 10 F7 00**

174. Convert the decimal number **25** to octal:

a. **31** *b.* **62** *c.* **19** *d.* **61** *e.* **C1**

175. If a machine stores a 32-bit integer **0x41424344** in memory with **0x41** at the lowest/smallest memory location, then you know:

a. the machine is using Little Endian byte order
b. the machine is using ASCII byte order
c. the machine is using Big Endian byte order
d. nothing - byte order doesn't apply to 32-bit integers
e. the machine is using UTF-8 byte order

176. The one's complement of binary **11001100** is:

a. **01001101** *b.* **00110100** *c.* **11001101**
d. **00110011** *e.* **01001100**

177. Which sum fits in IEEE 754 single-precision floating point with no loss of range or precision?

a. $2^{129} + 2^{128}$ *b.* $2^{100} + 2^{70}$ *c.* $2^{100} + 2^{60}$
d. $2^{120} + 2^{100}$ *e.* $2^{100} + 2^{50}$

178. Express in hex the value stored in memory by:

```
char x = 0x28 | 0xAA
```

a. **D2 hexadecimal** *b.* **2A hexadecimal**
c. **28AA hexadecimal** *d.* **28 hexadecimal**
e. **AA hexadecimal**

179. Convert two's complement 12-bit hexadecimal **E60h** to decimal:

a. **-416** *b.* **512** *c.* **-415**
d. **3680** *e.* **518**

180. Which is equivalent to: **(ab')'**

a. **a + b'** *b.* **ab** *c.* **a'b'**
d. **a' + b** *e.* **a'b**

181. How many different bit patterns (numbers) can be represented with 11 bits?

a. **4096 patterns** *b.* **2048 patterns**
c. **1024 patterns** *d.* **2047 patterns**
e. **22 patterns**

182. What are the smallest and largest decimal integers a 7-bit word can hold using a sign/magnitude representation?

a. **-63** → **63** *b.* **-64** → **63** *c.* **-0** → **63**
d. **-0** → **127** *e.* **-128** → **127**

183. Express the IPv4 address **127.0.0.1** in hexadecimal in Intel hardware byte order:

a. **10 00 00 F7** *b.* **00 10 F7 00**
c. **01 00 00 7F** *d.* **7F 00 00 01**
e. **F7 00 00 10**

184. Here is one line (16 bytes) of a hexadecimal memory dump:
00 41 00 42 00 43 00 44 00 30 00 31 00 32 00 33
You are told this is character data. What kind of character data is it?

a. UNICODE *b.* EBCDIC
c. ASCII *d.* UTF-8
e. ISO-8859-1 (Latin-1)

185. Choose the best coding practice for testing floating-point equality:
   a. `if ( (abs(x) - abs(y)) <= 1e-5 ) { ...`
   b. `if ( abs(x-y) < 1e-5 ) { ...`
   c. `if ( (x-y) == 0.0 ) { ...`
   d. `if ( (x-y) <= 1e-5 ) { ...`
   e. `if ( x == y ) { ...`

186. Calculate the **4**-bit hexadecimal bit-wise operation **`Ch & 6h`**:
   a. **`12h`** *b.* **`18h`** *c.* **`Ah`** *d.* **`Eh`** *e.* **`4h`**

187. Convert unsigned octal (base 8) **`200`** to decimal:
   a. 16 decimal *b.* 256 decimal *c.* 128 decimal
   d. 64 decimal *e.* 512 decimal

188. In 11-bit two's complement representation, what decimal number do you get when you add one to decimal **`1,023`**:
   a. **`-1`** *b.* **`1,024`** *c.* **`-1,024`**
   d. **`-1,023`** *e.* **`0`**

189. In 16-bit two's complement representation, what decimal number do you get when you add one to decimal **`32,767`**:
   a. **`-1 decimal`** *b.* **`0 decimal`**
   c. **`-32,767 decimal`** *d.* **`32,768 decimal`**
   e. **`-32,768 decimal`**

190. Which ASCII character has the smallest numeric value?
   a. **`'0'`** *b.* **`'9'`** *c.* **`SPACE`**
   d. **`'a'`** *e.* **`'A'`**

191. How many different bit patterns (numbers) can be represented with 10 bits?
   a. **`511`** *b.* **`2048`** *c.* **`20`**
   d. **`1024`** *e.* **`512`**

192. If you add two to 8-bit hexadecimal **`7Eh`**, what hex number do you get?
   a. **`80h`** *b.* **`100h`** *c.* **`7Eg`**
   d. **`10h`** *e.* **`7Ei`**

193. Without converting, which value sum fits in IEEE 754 single-precision floating-point with no loss of range or precision:
   a. $2^{29} + 2^{10} + 2^{9} + 2^{0}$ *b.* $2^{29} + 2^{28} + 2^{2} + 2^{1}$
   c. $2^{50} + 2^{48} + 2^{37} + 2^{36}$ *d.* $2^{26} + 2^{0}$
   e. $2^{27} + 2^{23} + 2^{1}$

194. How large is a 90 gigabyte disk drive?
   a. 900,000,000,000,000 bytes *b.* 900,000,000 bytes
   c. 90,000,000,000 bytes *d.* 90,000,000 bytes
   e. 90,000,000,000,000 bytes

195. Choose the best coding practice for testing floating-point equality:
   a. `if ( (abs(x) - abs(y)) <= 1e-5 ) { ...`
   b. `if ( abs(x-y) < 1e-5 ) { ...`
   c. `if ( (x-y) <= 1e-5 ) { ...`
   d. `if ( x == y ) { ...`
   e. `if ( (x-y) == 0.0 ) { ...`

196. Write the simplest IF statement (simplify the Boolean logic) for the following programming problem specification: *Call the DEL routine* **unless***:* **id** *is less than than* **zero** *and* **var** *is greater than* **five***:*
   a. **`IF id >= 0 OR var <= 5 CALL DEL()`**
   b. **`IF NOT (id < 0) AND NOT (var > 5) CALL DEL()`**
   c. **`IF id < 0 AND var > 5 CALL DEL()`**
   d. **`IF id > 0 AND var < 5 CALL DEL()`**
   e. **`IF id > 0 OR var < 5 CALL DEL()`**

197. If a machine stores the UTF-8 character string **`ABCD`** in memory with **`0x41`** at the lowest/smallest memory location, then you know:
   a. nothing - byte order doesn't affect UTF-8
   b. the machine is using ASCII byte order
   c. the machine is using Big Endian byte order
   d. the machine is using Little Endian byte order
   e. the machine is using UNICODE byte order

198. What is the likely final value of variable **`z`** in this IEEE 754 single-precision pseudo-code fragment:
```
float x = 2^50 + 5
float y = 2^50 + 3
float z = x + y
```
   a. $z \leftarrow 2^{51}$ *b.* $z \leftarrow 2^{50} + 8$
   c. $z \leftarrow 2^{51} + 8$ *d.* $z \leftarrow 2^{50} + 2$
   e. $z \leftarrow 2^{50}$

199. How large is a 100 gigabyte disk drive?
   a. 100,000,000,000,000,000 bytes
   b. 100,000,000,000,000,000,000 bytes
   c. 100,000,000,000,000 bytes
   d. 100,000,000 bytes
   e. 100,000,000,000 bytes

200. Encode ASCII **`'A'`** as odd parity:
   a. **`41h`** *b.* **`0Ah`** *c.* **`61h`** *d.* **`E1h`** *e.* **`C1h`**

201. How many Kilo (K) are in a Giga (G)?
   a. one billion (G) (one thousand million)
   b. one hundred (H)
   c. one million (M)
   d. one thousand (K)
   e. ten (T)

202. How do the ASCII character set and the UTF-8 character set relate to each other?
   a. The first 256 characters of UTF-8 are ASCII, but in 16-bit form.
   b. The first 256 characters of UTF-8 are identical to ASCII.
   c. The first 128 characters of UTF-8 are ASCII, but in 16-bit form.
   d. The first 128 characters of UTF-8 are identical to ASCII.
   e. The first 512 characters of UTF-8 are ASCII, but in 16-bit form.

203. When representing integers, the most common method for indicating negative numbers means:
   a. the highest (top-most) bit will always be 1
   b. you add up the number of 1 bits and ensure that the count is odd
   c. the highest (top-most) byte will always be F or 8
   d. you add up the number of 1 bits and ensure that the count is even
   e. the lowest (bottom-most) bit will always be 1

204. How many Kilo (K) are in a Tera (T)? *(Note: billion = thousand million)*
   a. one peta *b.* one tera *c.* one billion
   d. one million *e.* one thousand

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