ELEC 2200-003 Digital Logic Circuits
Fall 2011

Classwork 4 Problems

Assigned 9/30/11, due 9/30/11

**Answer the following questions, selecting just one answer per question.**

1. What types of electronic circuits does a transceiver of a cell phone contain?

1. Analog
2. Digital
3. Memory
4. Combination of digital, mixed-signal and RF
5. None of the above

2. What are the five building blocks of a digital computer?

1. Memory, logic, passive and active components
2. Datapath, control, memory, input and output
3. Display screen, keyboard, mouse, power supply and cooling fan
4. Transistors, chips, resistors, capacitors and inductors
5. Hardware, software, firmware, programmer and operator

3. What is the radix for binary numbers?

1. 1
2. 2
3. 4
4. 8
5. 10

4. What format does a modern digital computer use to represent real numbers?

1. Signed magnitude
2. Decimal
3. 1’s complement
4. IEEE 754 Standard format
5. 2’s complement

5. How can you tell whether a 2’s complement integer is positive or negative?

1. By complementing all bits
2. By complementing all bits and then adding 1
3. Negative only if adding the number to its magnitude produces 0
4. Positive if MSB = 0, negative if MSB = 1
5. Negative if MSB = 0, positive if MSB = 1

6. What is the negation rule for 2’s complement numbers?

1. Invert the MSB
2. Invert all bits
3. Invert all bits and add 1
4. Change MSB to 1
5. Invert all bits and subtract 1

7. What indicates overflow when two n-bit 2’s complement integers are added?

1. A carry of 1 is generated when MSB’s are added
2. Two numbers being added have opposite signs
3. Two numbers being added have the same sign
4. Two numbers have the same MSB, which differs from the MSB of sum
5. None of the above

8. What is the number of bits needed to hold the product of two n-bit 2’s complement integers?

1. n
2. More than n
3. 2n
4. n +1
5. n2

9. How many iterations does binary division of n-bit integers require?

1. 1
2. Many, until the result converges
3. n/2
4. Exactly n
5. n2

10. What defines the Hamming distance between two n-bit binary vectors?

1. Cartesian distance between the tips of the two vectors
2. Manhattan distance
3. 0 ≤ Hamming distance ≤ n
4. Number of bits in which the two binary vectors match
5. Number of bits in which the two binary vectors differ

11. What is the bias used for the exponent of an IEEE 754 floating point number?

1. None
2. 255
3. – 255
4. Biased exponent = true exponent – 127
5. Biased exponent = true exponent + 127

12. How will you determine the sign of an IEEE 754 floating point number?

1. All numbers above certain threshold are negative
2. MSB = 0 for negative, MSB = 1 for positive
3. MSB = 0 for positive, MSB = 1 for negative
4. Always positive
5. Cannot tell

13. Find the decimal value of the following 32-bit floating point number represented in IEEE 754 format: 1 10000001 1000 0000 0000 0000 0000 000

1. 7.0
2. – 7.0
3. Negative 0
4. Negative infinity
5. – 6.0

14. How are two floating point numbers in IEEE 754 format multiplied by a digital circuit?

1. Both numbers converted to integers and multiplied
2. Convert multiplier to integer and add multiplicand to itself that many times
3. Numbers converted to logarithms and added
4. Multiply significands, add exponents, normalize, roundoff, add sign
5. Could be difficult

15. Suppose a and b belong to a set that defines a Boolean algebra, which also includes operations · and +. If a + b = a, then identify the identity element for + operation.

1. a
2. b
3. 0
4. 1
5. Cannot tell

16. For Boolean elements a, b and c, which of the following equations expresses commutativity:

(a) a + b = b + a

(b) a + (b + c) = (a + b) + c

(c) a (b + c) = ab + ac

(d) a + a = a

(e) a + ab = a

17. For Boolean elements a, b and c, which of the following equations expresses idempotency (invariance):

(a) a + b = b + a

(b) a + (b + c) = (a + b) + c

(c) a (b + c) = ab + ac

(d)a + a = a

 (e) a + ab = a

18. For Boolean elements a, b and c, which of the following equations expresses associativity:

(a) a + b = b + a

(b) a + (b + c) = (a + b) + c

(c) a (b + c) = ab + ac

(d) a + a = a

 (e) a + ab = a

19. For Boolean elements a, b and c, which of the following equations is an example of the absorption theorem:

(a) a + b = b + a

(b) a + (b + c) = (a + b) + c

(c) a (b + c) = ab + ac

(d) a + a = a

 (e) a + ab = a

20. For Boolean elements a, b and c, which of the following equations expresses distributivity:

(a) a + b = b + a

(b) a + (b + c) = (a + b) + c

(c) a (b + c) = ab + ac

(d) a + a = a

 (e) a + ab = a