Test 1 Review Computer Architectures

_____Name

Please write letter answer to the left of the question number.

History and Development of Digital Logic (**2 points each**)

1. Who is credited with developing the mathematical model of a device that can perform any computation?

   a. Alan Turing
   b. Charles Babbage
   c. Ada Lovelace
   d. John von Neumann

2. What is the name of the concept that states all computers can compute the same thing, given enough time and memory?

   a. Universality
   b. Layered Abstraction
   c. Moore's Law
   d. Turing Machine

3. What is the primary limitation of Moore's Law?

   a. Power consumption
   b. Heat generation
   c. Transistor density
   d. All of the above

4. How do computers represent data?

   a. Using presence or absence of a human
   b. Using 0s and 1s
   c. Using hexadecimal notation
   d. Using ASCII characters

5. What is the purpose of the two's complement representation of signed integers?

   a. To simplify arithmetic operations
   b. To improve memory efficiency
   c. To increase processing speed
   d. To reduce power consumption

6. What is **NOT** the result of performing a logical AND operation on two bits?

    a. 0 if either bit is 0
    b. 1 if either bit is 1
    c. 0 if both bits are 0
    d. 1 if both bits are 1

7. What is the purpose of a 2-input multiplexer?

    a. To select one of two inputs to pass to the output
    b. To select one of two outputs to pass the input
    c. To convert a binary signal to a hexadecimal signal
    d. To convert a hexadecimal signal to a binary signal

8. What is the primary function of a MOSFET (Metal-Oxide-Semiconductor Field-Effect Transistor)?

    a. To amplify analog signals
    b. To switch digital signals
    c. To convert analog signals to digital signals
    d. To convert digital signals to analog signals

9. What is the purpose of the gate voltage in a MOSFET?

    a. To control the flow of current
    b. To amplify the input signal
    c. To switch the transistor on or off
    d. To convert the input signal to a digital signal

10. What is the purpose of ASCII (American Standard Code for Information Interchange)?

    a. To represent binary data as text
    b. To represent text data as binary
    c. To convert binary data to hexadecimal
    d. To convert hexadecimal data to binary

11. What is the advantage of using hexadecimal notation?

    a. It is more compact than binary notation
    b. It is more readable than binary notation
    c. It is more efficient than binary notation
    d. It is more accurate than binary notation

12. What is the result of converting the binary number 1010 to hexadecimal?

    a. A
    b. B
    c. C
    d. D

13. What is the purpose of a 1-to-4 demultiplexer?

    a. To select one of four inputs to pass to the output
    b. To select one of four outputs to pass the input
    c. To convert a binary signal to a hexadecimal signal
    d. To convert a hexadecimal signal to a binary signal

14. What is the primary advantage of using a layered abstraction in computer design?

    a. Improved performance
    b. Reduced power consumption
    c. Increased code density
    d. Simplified design

15. What is the purpose of the instruction set architecture (ISA) in a computer system?

    a. To define the set of instructions that the processor can execute
    b. To define the set of registers that the processor can use
    c. To define the set of memory addresses that the processor can access
    d. To define the set of input/output devices that the processor can use

16. What is the primary advantage of using a microprocessor with a large word size?

    a. Improved performance
    b. Reduced power consumption
    c. Increased code density
    d. Simplified design

17. What is the primary application of a 2-input decoder?

    a. Arithmetic operations
    b. Memory cell selection
    c. Clock generation
    d. Data storage

18. In a 2-bit full adder counter, what happens after counting to 11 (binary)?

    a. It stops
    b. It returns to 00
    c. It continues to 100
    d. It maintains 11

19. What is the size scale of modern MOSFETs?

    a. Millimeters
    b. Centimeters
    c. Nanometers
    d. Kilometers

20. How many inputs does a basic 2-input multiplexer have?

    a. 1
    b. 2
    c. 3
    d. 4

21. What type of logic is used in digital circuits?

    a. Analog
    b. Binary
    c. Decimal
    d. Hexadecimal

22. The primary advantage of using a decoder for memory selection is: a. Faster operation
    b. Lower power consumption
    c. Reduced number of control signals
    d. Increased memory capacity

23. What determines the output selection in a multiplexer?

    a. Clock signal
    b. Selection line
    c. Input value
    d. Power supply

24. A 2-bit full adder can be used to create?

    a. A memory unit
    b. A program counter
    c. A power supply
    d. An input device

25. What is the primary advantage of using a 2-input decoder?

    a. Arithmetic operations
    b. Memory cell selection
    c. Clock generation
    d. Data storage

Markdown (10 points total, 6 for accuracy, 4 for neatness)

In the space below, write the markdown text to show the following. The parenthetical, italicize text describes the syntax required.:

My Markdown File (*heading 1*)

Introduction (*heading 2*)

Links (*heading 2*) (*bulleted list*)

Link1 (*hyperlink, web hyperlink link1*) Link2 (*hyperlink, file hyperlink link2*)

Images (*heading 2*) (*numbered list*)

Image1 (*image, use image1.png as image name*) Image2 (*image, use image1.png as image name*)

Boolean Algebra (**2 points each**)

Please write letter answer to the left of the question number.

1. What is the result of A AND A?

   a.0
   b.1
   c.A
   d.NOT A

2. What is the result of B OR 1?

   a.0
   b.1
   c.B
   d.NOT B

3. What is the result of (C AND D) OR E?

   a.(E OR D) AND (E OR C)
   b.(C AND D) OR (C AND E)
   c.C AND D
   d.C OR E

4. What is the result of NOT(A AND B)?

   a.(NOT A) OR (NOT B)
   b.(NOT A) AND (NOT B)
   c.A OR B
   d.A AND B

5. What is the result of E AND 0?

   a.0
   b.1
   c.E
   d.NOT E

Binary Math (**2 points each**)

Please write the answer legibly in the space to the right of the problem. First 6 questions worth 2 points each, last 2 questions are worth 4 points.

1.

```
  01101010
+ 00110101
```

2.

```
  11010101
- 01101010
```

3.

```
  10101010
+ 11010101
```

4.

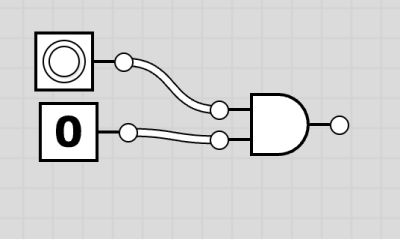
```
  01110101
- 10101010
```

5.

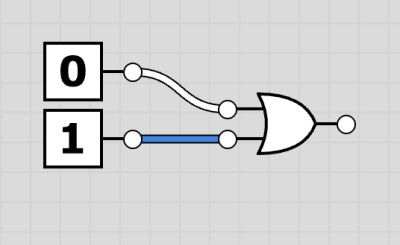
```
  11011111
+ 01110101
```

Digital Design (**4 points each**)

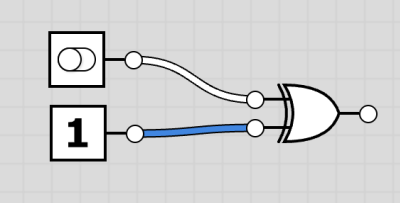
1. When the button is pushed what is the output?



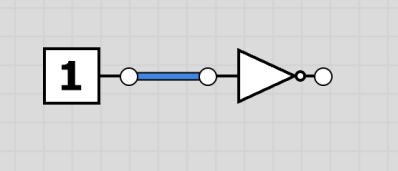
2. What is the value of the output?



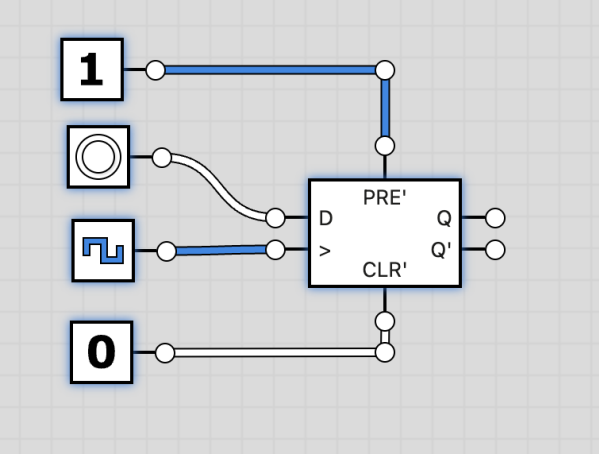
3. When the button is pushed what is the output?



4. What is the output?



5. When the button is pushed and the clock signal goes high, what is Q?



#	Answer	#	Answer
1.	a. Alan Turing	13.	b. To select one of four outputs to pass the input
2.	a. Universality	14.	d. Simplified design
3.	d. All of the above	15.	a. To define the set of instructions that the processor can execute
4.	b. Using 0s and 1s	16.	a. Improved performance
5.	a. To simplify arithmetic operations	17.	b. Memory cell selection
6.	b. 1 if either bit is 1	18.	b. It returns to 00
7.	a. To select one of two inputs to pass to the output	19.	c. Nanometers
8.	b. To switch digital signals	20.	b. 2
9.	c. To switch the transistor on or off	21.	b. Binary
10.	b. To represent text data as binary	22.	c. Reduced number of control signals
11.	b. It is more readable than binary notation	23.	b. Selection line
12.	a. A	24.	b. A program counter
		25.	b. Memory cell selection

```
# My Markdown File
## Introduction
## Links
* [Web Link1](https://link1)
* [File Link2] (./link2)
## Images
1. Image1 ![](./image1.png)
1. Image2 ![](./image2.png)
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Num	Boolean Algebra	Binary Math	Digital Design
1.	c. A	1001 1111	0 because of the 0 input on an AND
2.	b. 1	0110 1011	1 because of the 1 input on the OR
3.	a.(E OR D) AND (E OR C)	0001 0111 1111	0 as both inputs will be 1
4.	a. (NOT A) OR (NOT B)	1100 1011	0 as the NOT will invert the input
5.	a. 0	0001 0101 0100	Q will be 0 because CLR* is active