Name: ____________________________

Practice Final

1. Which of the following applies to Public Key Cryptography?
   A. Using Public Key cryptography, one of the two communicating parties must first SECRETLY communicate a special “key” to the other that they then use to carry on the rest of their secret communication.
   B. Using Public Key cryptography, ALL messages passed between the two parties can be read by a third party without risk of the secret communication being compromised.

2. According to the following html code, which expression is correct?
   `<br><a href="http://processing.org/">http://www.ucsc.edu/</a>`

3. Which of the following are true statements about CSS? Select ALL that apply.
   A. CSS allows you to separate the specific formatting information from the main body of an html document.
   B. CSS allows you to change how many html documents will be displayed by changing just a single file.
   C. CSS stands for Computer System Security.

4. True (A) or False (B). Google uses inbound links as part of its algorithm for ranking the relevant results.

5. True (A) or False (B). The step of “Building an index” is done each time you type a Web Search query.

6. If you are asked to guess a number between 1 and 300, what is the maximum number of guesses you will need using the optimal guessing strategy if after each guess you are told the guess was too big, too small, or you got it?
   A. 2  B. 4  C. 9  D. 16  E. 256

7. Google’s PageRank algorithm is (select ALL that apply)
   A. named after it’s creator and Google founder, Larry Page.
   B. used to determine which pages that match a query are most important.
   C. considered the “crown jewels” of Google’s search engine.

8. An algorithm that takes time proportional to $n$ is called an $n$-time or linear time problem. Which of the following is an example of a linear problem?
   A. Traveling Salesman problem
   B. Making an image lighter in your photo software
   C. Applying Bubble Sort to sort Google’s index of 25 million entries
   D. None of the above

9. The halting problem (determining if a program will halt given a specified input) is...
   A. an example of a polynomial time algorithm.
   B. an example of an exponential time algorithm.
   C. an example of a provably unsolvable problem.

10. What is the time complexity of guessing a number between 1 and $n$ if each time all you know is the guess was right or wrong?
    A. constant  B. $\log(n)$  C. linear ($n$)  D. polynomial but bigger than $n$  E. exponential
11. Suppose you want to visit 13 cities and you want to minimize how much you pay for airline tickets (the traveling salesman problem). Your algorithm consists of the following steps: (1) select an ordering of cities and compute the price; (2) pick another ordering and compute the price and then compare that price with the previous one; (3) At each step keep the cheapest itinerary (cheapest ordering). Which of the following statements are true?
   A. There are much better ways to solve this problem
   B. This is a polynomial time problem
   C. This is an NP-Complete Problem (requires exponential time)
   D. None of the above

12. What is the time complexity of guessing a number between 1 and n if each time you are told if the guess was too big, too small, or correct?
   A. constant  B. log(n)  C. linear (n)  D. polynomial but bigger than n  E. exponential

13. Which algorithm will run faster (complete more quickly) for large values of n?
   A. one that runs in time proportional to n, or
   B. one that runs in time proportional to log(n)?

14. Which algorithm will run faster (complete more quickly) for large values of n?
   A. one that runs in time proportional to n^2, or
   B. one that runs in time proportional to n×log(n)

15. Which of these analogies is the best match for sending a big message across the Internet?
   A. Sending a big message across the Internet is like a train with many cars (smaller packets) that are linked together to form a long train (the entire message).
   B. Sending a big message across the Internet is like sending a bunch of cars (smaller packets) that each take their own route to the destination and get reassembled after they all get there. Some might not even make it the first time.
   C. Sending a big message across the Internet is like pouring a lot of bits into a big box and then shipping it with USPS, not knowing exactly what route it will take to get there.
   D. Sending a big message across the Internet is like sending a bunch of cars (smaller packets) that each travel at their own pace but they all take the same route (follow the same map), although some might not make it the first time.
   E. Sending a big message across the Internet is like sending a message by putting it in a bottle, tossing it in the ocean, and hoping it makes it to its destination.

16. Which doesn’t belong on this list?
   A. Ethernet  B. http  C. x.25  D. html  E. ftp

17. Are Internet names (e.g. www.soe.ucsc.edu) and addresses (e.g. 128.115.27.53) hierarchical?
   A. Yes they are both hierarchical
   B. The names are hierarchical but not the addresses.
   C. The addresses are hierarchical but not the names.
   D. Neither is hierarchical.

18. What must fit in computer memory in order to give quick search results?
   A. The index (list) of terms (words etc.) and where on disk to find the pages that match each of those terms.
   B. The list of all URLs known to the search engine and their associated search terms.
   C. Neither A nor B fit entirely in the computers main memory.
   D. Both A and B need to fit to get good performance.
19. Which of the following is an example of information that is NOT hierarchical?
   A. A university course catalogue.
   B. Classification of animals (family, genus, species, etc.)
   C. Telephone numbers.
   D. The location of books in a book store.
   E. Your network of friends.

20. What is the name of a Vigénère cipher that is as long as the text? It is unbreakable in theory.
   A. Caesar Cipher
   B. Substitution Cipher
   C. One-time Pad
   D. Key-agreement Protocol
   E. Public Key Cryptography

21. What is the fastest known sorting algorithm?
   A. Bubble Sort
   B. Exchange Sort
   C. Quick Sort

22. Given the Vigenère cipher below, decode SOHEV.

   ABCDEFGHIJKLMNOPQRSTUVWXYZ
   MNOPQRSTUVWXYZABCDEFGHIJ
   DEFHIJKLMNOPQRSTUVWXYZABC
   HIJKLMNOPQRSTUVWXYZABCDEFG

   A. GLAZE  B. GLASS  C. GLOSS  D. GLEES

23. Public-key cryptography relies on the existence of one-way functions. Which of the following share the important characteristic of one-way functions? Check ALL that apply.
   A. Finding the capital of a country
   B. Squaring a number.
   C. Find the first sentence on a page given the page number and name of a book from a large pile of books (not using your computer or the Internet).
   D. Finding the best route between two cities.

24. What is the decimal equivalent of the binary number 110100?
   A. 12  B. 42  C. 45  D. 52  E. 103

25. What is the binary equivalent of the decimal number 39?
   A. 111010
   B. 110010
   C. 110000
   D. 100101
   E. 100111

26. For how many seconds does this script say “Hip”?  A. 3  B. 6  C. 13  D. 18  E. 24
27. For how many seconds does this script say "Hello"?
A. 1  B. 2  C. 3  D. 4  E. Forever

28. What is the value of result if 4 is input as x? Assume result is a global variable.
A. 12  B. 16  C. 20  D. 24  E. 28

29. Which of the following CORRECTLY computes the sum of the numbers from x to y, inclusive? Select ALL that apply. Caution some or all have been changed from the midterm. If they are all wrong select D.

30. What does clicking on the “mystery 4” block below display?
A. 12  B. 16  C. 24
31. The block on the previous question is best described by which of the following?
   A. Exponential block
   B. Recursive block
   C. Iterative block

32. What does the following program “say” when the "hello" block on the left is run?

A. “hello 3” then “hello 2” then “hello 1” then “hello 0”
B. “hello 3” then “hello 2” then “hello 1”
C. “hello 3” then “hello 3” then “hello 3”
D. “hello 0” then “hello 0” then “hello 0”
E. “hello 1” then “hello 2” then “hello 3”

33. Which of the answers below correctly specifies the values for the column Out? Each answer is a series of values for Out starting at the top of the column and going down.

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A. 1 0 1 0 0 1 1 1
B. 1 0 0 0 1 1 0
C. 1 1 0 1 1 1 1 1
D. 1 1 1 1 1 1 1 1
34. Which of the following trees could be a Huffman tree for symbols with the frequencies shown in the top row of circles? Check ALL that apply or mark C if neither are valid Huffman trees (If it is important, assume each left edge is labeled with a 1 and each right edge labeled with a 0.)

A

B