Ryan Farruggia

CSC 28

Professor Mayer

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Midterm Exam #2

1. Pro: Machine does not need a subtraction unit because the signed bit is already a negative value, thus removing a step. Con: Overflows can happen because the signed bit cannot be positively inverted since it is negative.

2. With size N\*N at N=1000, there will 1,000,000 multiplications with 500,000 additions.

3. Natural: Any whole positive integer.

Integers: Any non-fractional whole number.

Positive Integers: Any whole positive number greater than zero.

Real Numbers: Any number than can be continuously represented (not imaginary).

Rational Numbers: Any number than can be represented as the ratio of two integers.

4. Side effects are unusual actions performed by a program/function not intentionally coded to be strange in nature, but cause strange things to happen nonetheless. They are not errors. C++ enables side effects.

5. A byte is a binary set consisting of bits. Memory is always accessed by byte because it is far quicker and more efficient than by bit. Data is transferred between the CPU and memory via a data bus located in the motherboard. An aligned address is an arranged piece of memory that aids in ease-of-access when pertaining to information from the main memory.

6. There are 12 total outcomes for throwing a dice and a coin. The probability that 4 shows on the dice and the coin flips to heads is 1/12.

7. Permutation is a way/method that things are ordered. Combination is the pairing of different elements in a set of information. Permutations are generally greater in number than combinations. The formula for computing the number of Combinations (C) and Permutations (P) is n!/k!(n-k)!

8. A power set is the set of all subsets some set **S**. The power set P(S) = {}, {6}, {1}, {6, 1}, {9}, {6, 9}, {1, 9}, {6, 1, 9}, {100}, {6, 100}, {1, 100}, {6, 1, 100}, {9, 100}, {6, 9, 100}, {1, 9, 100}, {6, 1, 9, 100}. The power set P(S) contains 16 elements.

9. An algorithm is a series of instructions or rules that a program follows to produce a set of information based on data inputs, limits, user preference, etc.

10. Row-major order: indices of multi-dimensional arrays from right to left for each consecutive element or the next highest dimension. Has the most impact in Java and C++.

11. A recurrence relation does not require an initial value/condition but recursion does. Recurrence relations are always expressed in a formula whereas recursion can be indirect.

12. The Fibonacci sequence requires two direct initial inputs because recurrence relations typically require initial inputs, and this function is a solution to its own recurrence relation because it satisfies the requirements.

13. A parameter is a programming tool used to bind a call object to the function that’s calling it. It allows the passing of data through functions as variables, strings, etc. A value parameter (VP) is formal parameter that points to memory while the actual parameter (AP) is copied during runtime. A reference parameter (RP) is an addressable object that is implemented by passing the address of the actual parameter. An actual parameter is the initial parameter passed by a function, while the formal parameter points to the location where the AP is meant to be copied for functional use.

14. Uninitialized objects can cause problems because there is nothing for the formal parameter to copy during runtime, thus creating errors.

15. C++ directly inherits C’s parameter passing methods so naturally its syntax for array parameters remains the same.