Foundations of Discrete Mathematics
COT 2104
Chapter 8 (Answer_Review)

1. The word algorithm, like so many mathematical terms, has its origins in the Greek language.

    a) True
    b) False x

2. The word algorithm is used today as a synonym for procedure.
    a) True x
    b) False

3. It is unusual for a loop to appear in a programming language.
    a) True
    b) False x

4. Often the variable i used inside a loop is called a counter.
    a) True x
    b) False

5. Horner's Algorithm is a procedure used to evaluate polynomials.
    a) True x
    b) False

6. An algorithm that outputs the distinct elements in a list would output a list of two elements if given the input 3.1416, 22/7, π, ***e***, 2.71828.
    a) True
    b) False x

7. The average of integers 9, 10, 15 is (9+10+15)/2 =17
    a) True
    b) False x

8. Two 3-digit integers can always be added together using at most four basic operations.
    a) True
    b) False x

9. If f and g are functions $N \to R$, we say that f = O(g) if there is an integer n_0 such that $|f(n)| \leq c|g(n)|$ for all positive real numbers c and for all $n \geq n_0$.

a) True
b) False x

10. If f and g are functions $N \to R$, we say that f=O(g) if there is an integer n_0, and a positive real number c such that $|f(n)| \leq c|g(n)|$ for all and for all $n \geq n_0$.
a) True x
b) False

11. If f = O(g), then g = O(f).
a) True
b) False x

12. If f = O(g), then g + f = O(g).
a) True x
b) False

13. If f = O(g) and h = O(g), then f g = O(g).
a) True
b) False x

14. If $f(n) = 2n^2 + 3n - 1$ and $g(n) = 5n^2 - 2n + 7$, then f = O(g).
a) True x
b) False

15. If $f(n) = 2n^2 + 3n - 1$ and $g(n) = 5n^2 - 2n + 7$, then g = O(f).
a) True x
b) False

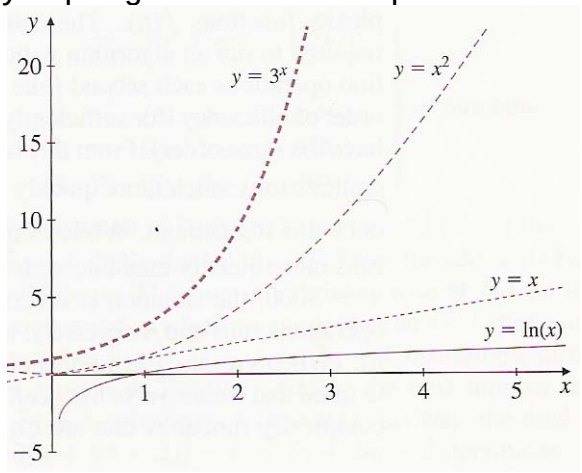
16. The relation same order defines an equivalent relation on the class of function $N \to R$.
a) True x
b) False

17. The relative orders and rates of growth of these functions is correct.

$$1 \prec \log n \prec n \prec n^a \prec b^n \prec n! \prec n^n.$$

a) True x
b) False

18. The picture shows the very slow growth of the logarithm and the very rapid growth of the exponential



a) True x
b) False

19. The symbol of the right side means that f has greater order than g

a) True
b) False x

20. The symbol of the right side means that f and g have the same order.

a) True x
b) False

21. If the list 2, 3, 4, 1 is searched for x = 4 using the Linear Search Algorithm, the output is "true" and the final value of i is 3.

a) True x
b) False

22. If the list 2, 3, 4, 1 is searched for x = 4 using the Binary Search Algorithm, the output is "true" and the final value of n is 0.

a) True x
b) False

23. Binary Search Algorithm is more efficient that the Linear Search Algorithm.

a) True x
b) False

24. Merge Algorithm is more efficient that the Bubble Search Algorithm.
    a) True x
    b) False

25. If the list 2, 5, 4, 1 is sorted using the Bubble Sort Algorithm, the first time the list changes it becomes 2, 5, 1, 4.
    a) True
    b) False x

26. If the list 2, 5, 4, 1 is sorted using the Bubble Sort Algorithm, the first time the list changes it becomes 2, 4, 5, 1.
    a) True x
    b) False

27. If the list L_1: 2, 5 and L_2: 1, 4 are merged using the Merge Algorithm, the first step is to define a new list L_3 containing no elements.
    a) True x
    b) False

28. If the list 2, 5, 4, 1 is sorted using the Merge Sort Algorithm, the final value of F is 0.
    a) True
    b) False x

29. The median of the numbers 1, 2, 3, 4, 5, 6, 7, 8 is 5.
    a) True
    b) False x