Started on	Tuesday, 22 June 2021, 12:36 PM
State	Finished
Completed on	Tuesday, 22 June 2021, 1:52 PM
Time taken	1 hour 15 mins
Marks	29.00/30.00
Grade	**9.67** out of 10.00 (**97**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Determine the smallest big-O of the function: (n^n + n2^n + 5^n)(n! + 5^n)

- a. O(n^n·n!)
- b. O(n^n)
- c. O(n!)
- d. O(n^n·5^n) ✔

The correct answer is: O(n^n·5^n)

Question **2**

Correct

Mark 1.00 out of 1.00

Determine whether each of these functions is O(x^2).

- a. f(x) = x^2 + 1000 ✔
- b. f(x) = 17x + 11 ✔
- c. f(x) = x logx ✔
- d. f(x) = x^4⁄2

The correct answers are: f(x) = 17x + 11, f(x) = x^2 + 1000, f(x) = x logx

Question **3**

Correct

Mark 1.00 out of 1.00

Determine the smallest big-O of the function: (2^n + n^2)(n^3 + 3^n)

- a. O(n^6)
- b. O(6^n) ✔
- c. O(5^n)
- d. O(n^5)

The correct answer is: O(6^n)

Question **4**

Correct

Mark 1.00 out of 1.00

How many strings are there of four lowercase letters that have the letter x in them?

- a. 15625
- b. 17576
- c. 36286
- d. 66351 ✔

The correct answer is: 66351

Question **5**

Correct

Mark 1.00 out of 1.00

How many strings of eight English letters are there that start with X, if no letter can be repeated?

- a. 2,422,728,000 ✔
- b. 127,512,000
- c. 6,375,600
- d. 43,609,104,000

The correct answer is: 2,422,728,000

Question **6**

Correct

Mark 1.00 out of 1.00

The solution to the recurrence relation A[n] = A[n-1] + 2.n, with initial term A[0]=2 are A[n]=?.

- a. [n * (n+1)] + 2 ✔
- b. 3 * (n^2)
- c. 4*n + 7
- d. 5 * (n+1)/2

The correct answer is: [n * (n+1)] + 2

Question **7**

Incorrect

Mark 0.00 out of 1.00

How many digit-strings of length 10, start with 44 and end with 9?

- a. 10^8 + 10^9 – 10^7 ✖
- b. 10^7
- c. 2^8 + 2^9 – 2^7
- d. 2^7

The correct answer is: 10^7

Question **8**

Correct

Mark 1.00 out of 1.00

Find a formula for 1·1!+2·2!+...+n·n!, where n is a positive integer.

- a. (n – 1)! + 1
- b. (n + 1)! – 1 ✔
- c. (n – 1)! – 1
- d. (n + 1)! + 1

The correct answer is: (n + 1)! – 1

Question **9**

Correct

Mark 1.00 out of 1.00

Determine the big-O of the function: 2^x + 17

- a. O(x)
- b. O(x^2)
- c. O(3^x) ✔
- d. O(1^x)

The correct answer is: O(3^x)

Question **10**

Correct

Mark 1.00 out of 1.00

What time does a 24-hour clock read 137 hours after it reads 21:00?

- a. 10:00
- b. 14:00 ✔
- c. 16:00
- d. 06:00

The correct answer is: 14:00

Question **11**

Correct

Mark 1.00 out of 1.00

How many bit-strings of length 10, either start with 00 or end with 1?

- a. 2^9 + 2^8
- b. 2^10
- c. 2^7
- d. 2^9 + 2^8 - 2^7 ✔

The correct answer is: 2^9 + 2^8 - 2^7

Question **12**

Correct

Mark 1.00 out of 1.00

Find gcd(2·3·5·7·11·13, 2^11·3^9·11·17^14).

- a. 55
- b. 330
- c. 30
- d. 66 ✔

The correct answer is: 66

Question **13**

Correct

Mark 1.00 out of 1.00

[Fig1]. Determine the least number of comparisons, or best-case performance, required to find the maximum of a sequence of n integers, using the following algorithm.

```
procedure max(a_1, a_2, ..., a_n: integers)
max := a_1
for i := 2 to n
        if max < a_i then max := a_i
return max{max is the largest element}
```

- a. 2n, O(2n)
- b. 2n-1, O(n) ✔
- c. 2n+1, O(2n)
- d. 2n+1, O(n)

The correct answer is: 2n-1, O(n)

Question **14**

Correct

Mark 1.00 out of 1.00

What are the quotient and remainder when 1,234,567 is divided by 1001?

- a. 334, 1233
- b. 1233, 233
- c. 233, 1233
- d. 1233, 334 ✔

The correct answer is: 1233, 334

Question **15**

Correct

Mark 1.00 out of 1.00

Determine the pairwise relatively prime.

- a. 21,34,55 ✔
- b. 14,17,85
- c. 17,18,19,23 ✔
- d. 25,41,49,64 ✔

The correct answers are: 17,18,19,23, 25,41,49,64, 21,34,55

Question **16**

Correct

Mark 1.00 out of 1.00

How much time does an algorithm take to solve a problem of size n if this algorithm uses 2n^2 + 2^n operations, each requiring 10^−9 seconds, with n=10?

- a. 1.224·10^-6 ✔
- b. 1.05·10^-3
- c. 1.224·10^-3
- d. 1.05·10^-6

The correct answer is: 1.224·10^-6

Question **17**

Correct

Mark 1.00 out of 1.00

Give a recursive definition of the sequence a[n]=n(n+1), n=1,2,3,...

- a. a[n] = a[(n-1)] + 2n ✔
- b. a[n] = a[(n-1)] + n
- c. a[n] = 2(a[(n-1)]+1) + n
- d. a[n] = 2(a[(n-1)]+1) + 2

The correct answer is: a[n] = a[(n-1)] + 2n

Question **18**

Correct

Mark 1.00 out of 1.00

Determine the big-O of the function: 1^k + 2^k +⋯+ n^k

- a. O(n^(k-1))
- b. O(n^k)
- c. O((n+1)^k)
- d. O(n^(k+1)) ✔

The correct answer is: O(n^(k+1))

Question **19**

Correct

Mark 1.00 out of 1.00

Determine the smallest big-O of the function: (n^3+n^2log(n))(log(n)+1) + (17log(n)+19)(n^3+2)

- a. O(n^5·log(n))
- b. O(n^2·log(n))
- c. O(n^3·log(n)) ✔
- d. O(n^3+n^2log(n))

The correct answer is: O(n^3·log(n))

Question **20**

Correct

Mark 1.00 out of 1.00

Determine the big-O of the function: (x^3 + 2x)/(2x + 1)

- a. O(2x)
- b. O(x^2) ✔
- c. O(2^x)
- d. O(x^1)

The correct answer is: O(x^2)

Question **21**

Correct

Mark 1.00 out of 1.00

If f1(x) is O(g1(x)) and f2(x) is O(g2(x)), then (f1+f2)(x) is _____.

- a. O(max{g1(x), g2(x)}) ✔
- b. O((g1+g2)(x))
- c. O(min{g1(x), g2(x)})
- d. O((g1*g2)(x))

The correct answer is: O(max{g1(x), g2(x)})

Question **22**

Correct

Mark 1.00 out of 1.00

Determine the integer primes.

- a. 113 ✔
- b. 107 ✔
- c. 101 ✔
- d. 143

The correct answers are: 101, 107, 113

Question **23**

Correct

Mark 1.00 out of 1.00

Convert 1010110101 from binary notation to decimal notation.

- a. 677
- b. 693 ✔
- c. 661
- d. 565

The correct answer is: 693

Question **24**

Correct

Mark 1.00 out of 1.00

Find the value of A[4] for the recurrence relation A[n] = 2.A[n-1] + 3, with A[0]=6.

- a. 221
- b. 141 ✔
- c. 65
- d. 320

The correct answer is: 141

Question **25**

Correct

Mark 1.00 out of 1.00

Given the message "BRX PHHW", encrypted by Caesar cipher. Which is the orginal message?

- a. YOU MEET ✔
- b. THE PARK
- c. MEET YOU
- d. PARK THE

The correct answer is: YOU MEET

Question **26**

Correct

Mark 1.00 out of 1.00

Determine whether each of these functions is O(x^2).

- [ ] a. f(x) = 2^x
- [x] b. f(x) = ⌊x⌋ · ⌈x⌉ ✔
- [x] c. f(x) = x logx ✔
- [ ] d. f(x) = x^4/2

The correct answers are: f(x) = ⌊x⌋ · ⌈x⌉, f(x) = x logx

Question **27**

Correct

Mark 1.00 out of 1.00

How many positive integers between 1000 and 9999 inclusive are divisible by 5 but not by 7?

- a. 965
- b. 1256
- c. 1543 ✔
- d. 1250

The correct answer is: 1543

Question **28**

Correct

Mark 1.00 out of 1.00

In a multiple-choice question paper of 15 questions, the answers can be one of A, B, C or D. The number of different ways of answering the question paper are _____.

- a. 87228×4^6
- b. 65536×4^7 ✔
- c. 23650×4^9
- d. 54160×4^8

The correct answer is: 65536×4^7

Question **29**

Correct

Mark 1.00 out of 1.00

Find a formula for 1^3+2^3+...+n^3, where n is a positive integer.

- a. [n(n+1)/2]^2 ✔
- b. [n(n+1)/3]^2
- c. [n(n+1)/3]^3
- d. [n(n+1)/2]^3

The correct answer is: [n(n+1)/2]^2

Question **30**

Correct

Mark 1.00 out of 1.00

Which of the following is the biggest algorithm-complexity?

- a. O(n^2)
- b. O(1000^n)
- c. O(n * log(n))
- d. O(n!) ✔

The correct answer is: O(n!)

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