Quiz Submissions - Fall 2021 Quiz 01

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Exit Preview

Attempt 2

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Submission View

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Question 1 **0 / 1 point**

How many times is function F called in the code segment? Choose the tightest bound

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for(i = n; i > 0; i = i - 4):
    for (j = 1; j < i; j = 2*j):
        F(i, j)
        F(i, j)
    end for
end for
------------------------------
```

- ➡ ○ $O(n \log(n))$
- ○ $O(n\sqrt{n})$
- ○ $O(1)$
- ○ $O(n)$

Question 2 **0 / 1 point**

Which of the below statements are true (All logarithm bases are 2)?

$$f(n) = 42n^3 + 28n^2 \log^4(n) + 74n \log(n) + 2$$

- ✖ ☐ $f(n) = O(n^5)$
- ✖ ☐ $f(n) = \theta(n^3)$
- ✔ ☐ $f(n) = O(n^2 \log^4(n))$
- ✖ ☐ $f(n) = O(n^3 \log^6(n))$

Question 3 **0 / 1 point**

All logarithm bases are 2

$$\log(\log(n)) = O\left(\frac{\log(n)}{\log(\log(n))}\right)$$

- ➡ ○ True
- ○ False

Question 4 **0 / 1 point**

All logarithm bases are 2

$$8^{\log(n)} = O(0.9^n)$$

- ○ True
- ➡ ○ False

Question 5 **0 / 1 point**

You are creating a 5-digit pin code, and the numbers 2 and 5 must be included. How many possible pin codes can be created? (numbers can be repeated in the pin code)

- ○ 4970
- ➡ ○ 14670

- 5040
- 20000

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- We reason there are 9^5 codes without a 2, 9^5 codes without a 5, and 8^5 codes without a 2 or a 5. Because the 8^5 codes without a 2 or a 5 are counted in both the codes without a 2 and without a 5, the total number of codes without a 2 or a 5 is 2*9^5 - 8^5.
- Using complementary counting, we have 10^5 possible codes minus 2*9^5-8^5 invalid codes, which is 10^5 - (2*9^5-8^5) = 14670 possible codes.

Question 6 **0 / 1 point**

Consider the functions

$$f(n) = n!$$
$$g(n) = (2n)!$$
$$h(n) = 5n!$$

Which of these relationships are true?

- ☐ $f(n) = O(g(n))$
- ☑ $h(n) = \Theta(g(n))$
- ☐ $g(n) = \Omega(h(n))$

Question 7 **0 / 1 point**

In how many ways can 8 people form couples of 2?

- 105

- 28
- 50
- 5

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- Sequentially choose couples from the 8, so multiplied combinations
- Order of couples and order of people within couples does not matter, so divide by 4!
- [(8 choose 2) * (6 choose 2) * (4 choose 2) * (2 choose 2)] / 4! = 105

Question 8 **0 / 1 point**

How many words can be made by rearranging "aabbccdd," such that no 'a' appears somewhere to the right of some 'c'? A word is any sequence of all 8 characters in the string, and flipping the positions of two of the same letter does not change the word.

E.g.: "abcaddcb" is an invalid word and flipping the two a's does not change the fact it is invalid. "aabdcbcd" is a valid word

- 1680
- 625
- ➡ 420
- 43

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Notice that if the positions of the b's and d's are fixed, the resulting word is uniquely determined by that fixing (you have no choice of how to place a's and b's).

Thus, it is sufficient to sequentially choose the positions for the b's and d's, giving us

$$\binom{8}{2} \cdot \binom{6}{2}$$

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Question 9 **0 / 1 point**

You go to a pizza party, and there are 5 types of pizza, each with unlimited slices. You have been studying non-stop for the CS 381 final for 3 days neglecting food and sleep, so you want to eat 13 slices. However, you want to sample each type at least once. In how many ways can you do this? Order does not matter

- 40320
- 56
- ➡ 495
- 390625

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We fix one slice of each type, which leaves us 8 slices to eat. Then, this is a straightforward "stars and bars" problem where we can choose freely with repetition. (8+5-1 choose 5-1) = (12 choose 4) = 495

Attempt Score:0 / 9 - 0 %

Done