

Q1 Sum & Product and Factorial notations

2 Points

Q1.1

1 Point

Choose ALL answers that are equal to the following expression:

$$\sum_{i=1}^4 2i$$

$2 \sum_{i=1}^4 i$

20

$1 + 2 + 3 + 4$

$2 + 4 + 6 + 8$

EXPLANATION

First, second and fourth answers are correct.

Q1.2

1 Point

Choose ALL answers that are equal to the following expression:

$$\prod_{i=1}^4 (i + 2)$$

$\prod_{i=3}^6 i$

$\prod_{i=2}^8 i$

$3 \cdot 4 \cdot 5 \cdot 6$

$6!/2!$

EXPLANATION

First, third and fourth answers are correct.

Q2 Sum & Product rules





2 Points

For each fill-in Concept Check question from now on, unless we specify something about the answer format (for example, sometimes we will ask you to give a fraction or decimal number), the answer will always be an INTEGER.

(Note: This is different from homework problems in which we don't require you to compute the final answer numerically. You can give your answer as a mathematical expression).

If you don't have a scientific calculator, a popular online tool that we recommend you to use in this class is WolframAlpha (<https://www.wolframalpha.com/>). It is known as a highly intelligent computational knowledge engine that can calculate a wide variety of complex mathematical expressions.

For example, to compute $P(3, 2)$, you can type in WolframAlpha as follows:

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Input:

$$\frac{3!}{(3-2)!}$$

$n!$ is the factorial function

Result:

6

Feel free to check out other syntaxes and use it regularly when doing problems in this class! Good luck!

Q2.1 Sum rule

1 Point

Anna goes to a pet shop and sees that it has 4 birds, 3 cats, and 6 dogs - all of which are unique. If she can only pick one unique animal as a pet, how many different choices does she have?

13

EXPLANATION

Use the sum rule! Because there are $4 + 3 + 6 = 13$ animals in the pet shop, she has 13 unique pet choices to choose from.

Q2.2 Product rule

1 Point

Aleks wants to fly from the US to Mexico and then to Singapore. There are 5 flights from the US to Mexico, and 8 flights from Mexico to Singapore. How many ways can he conduct his trip?

40

EXPLANATION

Using the product rule, there are $5 \cdot 8 = 40$ ways he can fly from the US to Mexico and then from Mexico to Singapore.

Q3 Permutations

1 Point

7 CSE 312 TAs want to take pictures with each other sitting on a bench, but the bench only has 4 seats. How many seating arrangements can they possibly have for their pictures, if order matters?

Hint: Think of this as a sequence of choices to decide which TA sits first, then which TA sits second. How many options do you have for the first choice? The second? etc.

840

EXPLANATION

Seating arrangements are ordered. This is a situation where we can apply the **product rule**, where there are 4 choices to make.

- First choice: 7 options
- Second choice: 6 options (since we already chose a TA to sit in the first spot)
- Third choice: 5 options
- Fourth choice: 4 options

So the total number of possibilities is $7 \cdot 6 \cdot 5 \cdot 4 = 840$ different ways they can sit with each other on the bench.

Q4 Subsets of TAs

1 Point

Suppose a particular course has 18 TAs. What is the number of distinct subsets of these TAs?

For example, suppose there are only two TAs: Shreya and Joseph. Then the possible subsets are

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{}  
{Shreya}  
{Joseph}  
{Shreya, Joseph}
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This problem is asking about the number of possible subsets of 18 TAs

262144

EXPLANATION

This question is asking about the power set of the set of TAs. In class, we discussed that for a set of size $|S|$, the powerset has $2^{|S|}$ elements. Since there are 18 TAs, then there are $2^{18} = 262,144$ subsets of them.