Worksheet 9 Solution

March 18, 2020

Question 1

a. Every set S of size 0 has $\frac{0(0-1)}{2} = 0$ subsets of size 2

b. Let $n = 0$, and S be an arbitrary set. Assume S has size 0.

Then, S only has empty subsets by the fact that S has size 0.

Since empty subset has size 0, there are 0 subsets with size 2.

c. **Section 1:**

Every set of size k has $\frac{k(k-1)}{2}$ subsets of size 2.

Section 2:

Every set of sie $k+1$ has $\frac{(k+1)k}{2}$ subsets of size 2.

Section 3.1:

Because we know

Index	Set	# of subsets of size 2 containing last element
2	$\{s_1, s_2\}$	has 1 subset containing s_2
3	$\{s_1, s_2, s_3\}$	has 2 subsets containing s_3
4	$\{s_1, s_2, s_3, s_4\}$	has 3 subsets containing s_4

, we can deduce from above that the number of subsets of size 2 containing s_{k+1} is k.

Section 3.2:

P(n): $\forall n \in \mathbb{N}$, every set of size n has $\frac{n(n-1)}{2}$ subsets of size 2

Let $k \in \mathbb{N}$, and assume P(k).

Then, the number of subsets of S of size 2 that don't contain s_{k+1} is $\frac{n(n-1)}{2}$.

Question 2

Question 3