Annotation Unit 7

The topic of the annotation is “series.” As usual, the passage firstly introduces the topic by giving the definition of the analyzed object (in this case, series) and how it is commonly denoted. Then it proceeds to describe its usage in different fields of science: namely, Physics, Computer Science, Finance.

After the introduction, the passage focuses on describing some details about *infinite* series calculations because, according to the passage, dealing with finite series does not require as advanced knowledge of Calculus and other related complicated Math topics as with the infinite one.

Speaking not strictly (since I anyway did not understand about a half of the passage considering that I am only a freshman 🙃), to calculate the sum $\sum_{k=k_0}^{\infty} a_k$ we need to find the associated sequence $\{S_j\}_{j=k_0}^{\infty} := \{\sum_{k=k_0}^{j} a_k\}_{j=k_0}^{\infty}$ and then find its limit $\lim_{k\to\infty} S_k$. The passage tries to give a broader definition, but the explanation above is sufficient to grasp the core idea.

As you might know from the Calculus class, the limit of some sequence either converges or diverges. We can also use these two properties to describe the infinite series by drawing parallels. Namely, if $\lim_{k\to\infty} S_k$ converges then $\sum_{k=k_0}^{\infty} a_k$ converges as well. Otherwise, the sum diverges. Passage tries to visualize this property by giving an example of a segment of length 2 in which we can always place another smaller segment of lengths $1, 1/2, 1/4, \ldots, 1/2^k, 1/2^{k+1}, \ldots$. Although this is not proof, it does help to understand the topic. Then the passage gives proof that $\sum_{k=0}^{\infty} \frac{1}{2^k} = 2$, but I will not elaborate on that.

Next, the passage describes two types of geometric series: pure geometric series and arithmetico-geometric series, and under which circumstances they converge and diverge. Also, it gives two other types of series: harmonic and alternating, but does not focus on them much.

Finally, the author describes three other essential concepts: non-negative terms, absolute convergence, and conditional convergence. As this annotation is already long enough, I won’t focus on each one.