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Math 501 Homework (§3.7 Infinite Series)

Problem 1. A scheme of building a bridge off a cliff is given. How long will the bridge grow?

Solution. This is the case of an infinite series concerning the length of the bridge – with just one brick, the length of the bridge $s_1 = 1/2$; with two, it's $s_2 = 1/2 + 1/4$ and so on.

Thus we find the overall length of the bridge to be the **geometric series** of the form:

$$S = \sum_1^\infty s_n = \sum_1^\infty \frac{1}{2n} = \frac{1}{2}\sum_1^\infty \frac{1}{n}$$

But we know that the sequence $(1/n) = \{1, \frac{1}{2}, \frac{1}{3}, \dots\}$ is **unbounded**, and conclude from the examples in the book that S, too, is **unbounded**.

In other words, this bridge will continue to grow *ad infinitum*. □