For Next Friday's Fun Fact:

The set of a game show has three closed doors. Behind one of these doors is a car; behind the other two are goats. The contestant does not know where the car is, but the host does.

- The contestant picks a door.
- The host opens one of the two *remaining* doors, one he **knows** doesn't hide the car, showing one of the two goats. (If the contestant has chosen the correct door, the host is equally likely to open either of the two remaining doors.)
- After the host has shown a goat, the contestant is always given the option to switch doors.

Question: What is the probability that the contestant will win the car if she stays with her first choice? Does that probability change if she changes to the remaining door?

Goal:

Work toward formalizing the idea of an **infinite sum**, so that we can use "infinite degree polynomials" to replace transcendental functions (because they're equal).

Recall:

Let $\{a_0, a_1, a_2, a_3, \ldots\}$ be a sequence.
Define the Partial Sums of the sequence:

$$\begin{aligned}
S_0 &= a_0 \\
S_1 &= a_0 + a_1 = \sum_{k=0}^{1} a_k \\
S_2 &= a_0 + a_1 + a_2 = \sum_{k=0}^{2} a_k \\
S_3 &= a_0 + a_1 + a_2 + a_3 = \sum_{k=0}^{3} a_k \\
&\vdots \\
S_n &= a_0 + a_1 + \ldots + a_n = \sum_{k=0}^{n} a_k
\end{aligned}$$

These form **the sequence of partial sums** $\{S_0, S_1, S_2, \ldots\}$.

In Class Work

For each series below:

(i) Find a_2 and a_3; S_2 and S_3.

(ii) Does the series converge or diverge? If it converges, find the value to which it converges.

(a) $\displaystyle\sum_{k=0}^{\infty} \frac{4}{3^k}$ (b) $\displaystyle\sum_{k=0}^{\infty} \frac{3^k}{(-4)^k}$