The Ninth Grade Math Competition Class
Decimals
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1. Convert repeating decimal $0.\overline{3123}$ to fraction.

2. Compute $\frac{4!+3!}{3!+2!}$. Express your answer as a decimal to the nearest hundredth.

3. What is the 4037^{th} digit following the decimal point in the expansion of $\frac{1}{111}$?

4. Evaluate the infinite geometric series

$$\frac{7^0}{100} + \frac{7^1}{100^2} + \frac{7^2}{100^3} + \cdots$$

as a fraction and find the first 6 digits in its decimal expansion.

5. Let S be the set of real numbers that can be represented as repeating decimals of the form $0.\overline{abc}$, where a, b, c are distinct digits. Find the sum of the elements of S.

6. The rational number r is the largest number less than 1 whose base-7 expansion consists of two distinct digits, i.e., $r = 0.\overline{AB}$. Written as a reduced fraction, $r = \frac{p}{q}$, find $p + q$.

7. Express $0.72\overline{45}$ as a common fraction.

8. Let p be a prime number other than 2 or 5. What is the maximum possible number of digits in the repeating block of digits in $\frac{1}{p}$?