The Ninth Grade Math Competition Class
Factorials and Palindrome
Anthony Wang

1. What is the largest 4-digit palindrome that is the sume of 2 different 3-digit palindromes?

2. Find the largest n for which 12^n evenely divides $20!$.

3. What is the first year after 2018 that is a palindrome?

4. What is the product of the largest 3 digit palindrome and the least 3 digit palindrome?

5. How many 5-digit palindromes are there?

6. Find the sum of all 3-digit plaindromes.

7. Palindromic primes are numbers that are both palindromic and prime. Find the greatest 3-digit palindromic prime?

8. A five-digit palindrome is a positive integer with respective digits $abcba$, where a is non-zero. Let S be the sum of all five-digit palindromes. What is the sum of the digits of S?

9. h There are unique integers $a_2, a_3, a_4, \ldots, a_7$ such that

$$\frac{5}{7} = \frac{a_2}{2!} + \frac{a_3}{3!} + \frac{a_4}{4!} + \frac{a_5}{5!} + \frac{a_6}{6!} + \frac{a_7}{7!},$$

with $0 \leq a_i \leq i$, for $i = 2, 3, \ldots, 7$. Find $a_2 + a_3 + \ldots + a_7$.