MAΘ Competition Team Homework Set 2

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Problem 1. Find the largest integer k for which 2^k divides 27!.

Problem 2. How many trailing zeros are at the end of 624!

Problem 3. Find the prime factorization of 12!.

Problem 4. What is the largest integer n for which 5^n is a factor of the sum 98!+99!+100! ?

Problem 5. In how many zeroes does the number $\frac{2002!}{(1001!)^2}$ end?

Problem 6. Let N be the number of consecutive 0's at the right end of the decimal representation of the product $1!2!3!4!\cdots 99!100!$. Find the remainder when N is divided by 1000.

Problem 7. The number $21! = 51,090,942,171,709,440,000$ has over $60,000$ positive integer divisors. One of them is chosen at random. What is the probability that it is odd?