

## Fun with Numbers

**Instructions:** Write the exact answer to each question in the corresponding blank. Remember that the winners in this event are those participants who answer the most questions correctly *in a row* beginning with the first question. So, try to get as far as you can without making a mistake!

1. Find the prime factorization of  $3^8 - 4$ .

1. \_\_\_\_\_

2. Evaluate the following arithmetic series and simplify your answer:

$$\frac{7}{6} + \frac{4}{3} + \frac{3}{2} + \cdots + 11$$

2. \_\_\_\_\_

3. Simplify the following and write your answer as a fraction in lowest terms:

$$\frac{(10^2 - 9^2)(10^2 - 8^2)(10^2 - 7^2)(10^2 - 6^2) \cdots (10^2 - 1^2)}{(9^2 - 8^2)(9^2 - 7^2)(9^2 - 6^2)(9^2 - 5^2)(9^2 - 4^2) \cdots (9^2 - 1^2)}$$

3. \_\_\_\_\_

4. A basketball team has won 7 games and lost 3 games. They have 19 more games to play. To win at least 60% of their games, how many more games must they win?

4. \_\_\_\_\_

5. Find the remainder when  $24^{50} - 15^{50}$  is divided by 13.

5. \_\_\_\_\_

6. We use  $n!$  to mean the product  $1 \cdot 2 \cdot 3 \cdots n$ . For example,  $4! = 1 \cdot 2 \cdot 3 \cdot 4 = 24$ . Find the largest prime divisor of the sum  $21! + 22!$ .

6. \_\_\_\_\_

7. On a recent math test, one sixth of the students got an A, one fourth got a C, one fifth got a B, two sevenths earned a D, and the remaining 41 students earned an F. How many students took the test?

7. \_\_\_\_\_

8. How many integers between 200 and 300 inclusive leave a remainder of 5 when divided by 8?

8. \_\_\_\_\_

**College of Charleston Math Meet 2019**

**Fun with Numbers Timed Sprint**

**Name (please print):** \_\_\_\_\_

**School:** \_\_\_\_\_

The grading for the Timed Sprints is unusual! Your grade will be the number of questions answered correctly, starting with the first question, before you make a mistake. For example, if you only answer questions 1-4 correctly and questions 7-13 correctly, your grade will be a "4" since you did not get question 5 right. You will have a limited amount of time to work on the sprint. Your paper will be collected at the end of this period.

By my signature below I certify that all of the work completed on this sprint is my own.