The 2020 Sprint

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. Which answer puts the following numbers in order from smallest to largest:
   \[2^{202}, \ 202^2, \ 202^{22}\]
   A. \(202^{22}, \ 202^2, \ 22^{202}\)
   B. \(202^2, \ 202^{22}, \ 22^{202}\)
   C. \(202^2, \ 22^{202}, \ 202^{22}\)
   D. \(202^{22}, \ 202^2, \ 22^{202}\)

2. Find the largest prime factor of 2020.

3. Solve the system of linear equations
   \[
   \begin{align*}
   \frac{1}{2}x - \frac{3}{2}y &= -32 \\
   10x + 5y &= 130
   \end{align*}
   \]
   Write your answer as an ordered pair \((x, y)\) or write “none” if no solution exists.

4. Find all values of \(y\) corresponding to points of intersection of the ellipse \(2x^2 = 16 - y^2\) and \((y - 4)^2 = 16 - 2x^2\). If none exist, write “none.”

5. What is the largest power of 2 that divides \(2^{2020} + 10^{2020}\)?

6. Find the remainder when the polynomial \(p(x) = (x - 2)^{2020}\) is divided by \(d(x) = x - 1\).

7. Find the sum of the roots of the cubic equation
   \[
   \frac{1}{10}x^3 - 2222x^2 + 2020x - \frac{1}{22} = 0.
   \]
College of Charleston Math Meet 2020

The 2020 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.