

Polynomials

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 coefficient of x^3 when $(x + 1)^6$ is fully expanded.

1. _____

2. Find the equation of the line that goes through $(2, 23)$ and has slope 2019. Write your answer in slope-intercept form.

2. _____

3. Suppose $p(x) = 2^9x + 2^7x^3 + 2^6x^4 + 2^5x^5 + 2^3x^7 + 2^2x^8$. What is the largest power of 2 that divides $p(-2)$ evenly (without a remainder)?

3. _____

4. Consider the quadratic polynomial $p(x) = x^2 + bx + c$. Given that b and c are positive integers, b is prime, and the graph of $p(x)$ has a single x -intercept, determine the exact value of $b + c$.

4. _____

5. A **fixed point** of a polynomial $p(x)$ is a value c so that $p(c) = c$. How many fixed points are there for $p(x) = x^2 - 1$?

5. _____

6. Determine the degree of the polynomial

$$p(x) = \prod_{k=1}^{100} (x^k + 1) = (x + 1)(x^2 + 1)(x^3 + 1)(x^4 + 1) \cdots (x^{99} + 1)(x^{100} + 1).$$

6. _____

College of Charleston Math Meet 2019

Polynomials 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.