DMC Mock March Target – 1 & 2

1. Bob and Bill each roll a 2017­-sided die. What is the probability that Bob’s number is greater than Bill’s number? Express your answer as a common fraction.
2. The sum of the arithmetic mean and geometric mean of two real numbers is 20. The positive difference between their arithmetic mean and geometric mean is 16. What is the maximum possible value of the larger of the two numbers?

DMC Mock March Target – 3 & 4

1. How many of the first 2018 positive integers have an odd number of positive factors?
2. The sequence $a\_{n}$ is defined by $a\_{1}=20,a\_{2}=19$ and for $n \geq 3$, $a\_{n}=\left|a\_{n-1}\right|-\left|a\_{n-2}\right|$. What is the value of $a\_{2019}$?

DMC Mock March Target – 5 & 6

1. A set of five distinct prime numbers has a mean of 10 and a median of 7. What is the greatest possible number in this set?
2. How many ways can 75 pretzels be distributed among 5 children if one child insists on having a prime number pretzels and everyone else must have at least 15 pretzels?

DMC Mock March Target – 7 & 8

1. The graph of the equation $\frac{xy-y}{2x-y+2}=a$, where $a$ is a positive number, intersects the line$ y = x$ at two points that are a distance of exactly 6 units apart. What is the value of $a$? Express your answer in simplest radical form.
2. Let $ABC$ be a triangle with sides $AB = 20, BC = 17, AC = 12$, and denote $w$ as the circumcircle of $ABC$. Let $P$ be a point on the minor arc $BC$, and let $K$ be the foot of the altitude from $P$ to $BC$ such that $BK = PK$ . What is the ratio between the areas of $BPK$ to $ABC$? Express your answer as a decimal to the nearest thousandth.