CALIFORNIA STATE UNIVERSITY, BAKERSFIELD

Lee Webb Math Field Day 2018

Team Medley, Freshman-Sophomore Level

Each correct answer is worth ten points. Answers require justification. Partial credit may be given. Unanswered questions are given zero points.

You have 50 minutes to complete the Exam. When the exam is over, give only one set of answers per team to the proctor. Multiple solutions to the same problem will invalidate each other.

Elegance of solutions may affect score and may be used to break ties.

All calculators, cell phones, music players, and other electronic devices should be put away in backpacks, purses, pockets, etc. Leaving early or otherwise disrupting other contestants may be cause for disqualification.

1. How many 3 digit numbers are there such that 2 of the digits add up to the third digit?

2. Suppose f is a function such that $f(6)=2018$ and $f(2018)=11$. Show that f can not be a polynomial of any degree with integer coefficients.

3. Show that there are no two perfect squares that differ by 2018.

4. Determine which of the following is larger: $\sqrt{589}+\sqrt{667}$ or $\sqrt{551}+\sqrt{713}$.

4. Point P is inside an equilateral triangle. The distances from P to the sides of the triangle are 3, 4, and 5. What is the area of the triangle?

5. In triangle ABC, let a and b be the lengths of the two sides that meet at C. Also, let m be the length of the median from C. Prove that $a+b>2m$.

6. Find all the values of k such that the least common multiple of 6^6, 8^8, and k is 12^{12}.