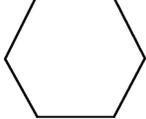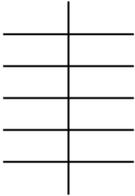# The $\mathbb{M}$andelbrot $\mathbb{C}$ompetition
Round One Test

Time Limit:
40 minutes

Name: _____

1. At the Small Fry Cafe a sales tax is added to the bill, equal to 5% of the amount spent on food. After dinner Sydney is debating whether or not to consume a jumbo banana split, which costs \$4.60. If she decides to order the banana split, then by how much will the amount of tax she pays increase?

①

2. Which of the following graphs contains at least three distinct points that all lie on a single line? (Simply write A, B, or C for your answer.)

    A. $y = 2\sin x$ B. $y = \ln(x-1)$ C. $y = x^2 + 4$

①

3. One creates a hexagon sum by placing the numbers 1, 2, 3, 4, 5 and 6 in any order at the vertices of a hexagon. Next multiply the numbers at the endpoints of each segment, then add up all six products. What is the smallest possible hexagon sum?

②

4. Find a pair of positive integers m and n such that $\dfrac{m - 2n}{3m - 4n} = 5$.

②

5. Of all triangles having integer side lengths, a perimeter of 37, and one side of length 17, which one has minimal area? Write your answer in the form (a, b, c), where a, b, and c are the side lengths, listed in increasing order.

②

6. Troy must put a black, maroon, or white car into each of twelve spots in a small parking lot. He prefers to park them so that no two adjacent cars, either horizontally or vertically, are the same color. (Diagonally is OK.) With these restrictions, in how many ways could he choose the colors of the cars in each spot?

③

7. What fraction of the form $\dfrac{A}{x+3}$ can be added to $\dfrac{6x}{x^2 + 2x - 3}$ so that the result reduces to a fraction of the form $\dfrac{B}{x-1}$? Here A and B are real numbers. Give the value of A as your answer.

③

SCORE: