

Name: _____

Directions: All questions require explanation in English sentences.

1. [**2 parts, 3 points each**] Find a formula for the following sums.

(a) $1 + 2 + 3 + \cdots + n$

(b) $1 + 2 + 3 + \cdots + 5n$

2. [**2 points**] Suppose the numbers $1, 2, 3, \dots, 3n$ are split into three sets of equal size with equal sum. Find a formula for the “magic sum” of each group. (For example, when $n = 3$, we can split $1, 2, 3, \dots, 9$ into equal-sized sets A, B, C with $A = \{1, 6, 8\}$, $B = \{2, 4, 9\}$, and $C = \{3, 5, 7\}$. In this case, the “magic sum” is 15.)

3. [**2 points**] Suppose that 20 lines are drawn in the plane. Assuming that no two lines are parallel and no three lines have a common intersection point, how many regions are there?