Homework 2

Recall that $R(3, 3, 3)$ is the smallest number $n$ such that we cannot use 3 colours to draw lines between $n$ points without forming a triangle whose sides are all the same color.

1) Show that $R(3, 3, 3) \leq 17$

2) Find a lower bound for $R(3, 3, 3)$ (full marks for showing $R(3, 3, 3) > 12$).

Prove the following statements by induction:

3) $n^3 + 5n$ is a multiple of 6 for all positive whole numbers $n$.

4) $1^2 + 2^2 + \cdots + n^2 = \frac{n(n+1)(2n+1)}{6}$.

5) $1 + 5 + 9 + \cdots + (4n - 3) = n(2n - 1)$

6) $n! > 4^n$ for all $n$ bigger than some $N$. What is $N$?
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