MATH 3790 - Assignment 2

Due Oct 16

October 9, 2003

1. Show that there is no polynomial p with integer coefficients such that $p(1) = 4$ and $p(3) = 7$.

2. Prove that the sequence $\{11, 111, 1111, 11111, ...\}$ contains no perfect squares.

3. In the magical land of Camelot, there are 45 chameleons. Thirteen are lavender, fifteen are beige and seventeen are aquamarine. Whenever two chameleons of different colours meet, they both change into a chameleon of the third colour. Prove that no matter how many times these chameleons meet, it is impossible for all of the chameleons to be of the same colour at one time.

4. Pick any 5 lattice points in the plane (points where the x and y coordinates are both integers). Prove that the midpoint of a line segment defined by some pair of these points is again a lattice point.

5. Show that there is an integer whose digits are all 0s and 1s which is divisible by 2003.

6. (BONUS) Find all integer solutions (x, y, z) to the equation $x^2 + y^2 = 3z^2$.