Homework 9, due 5/12, 10pm

1. The general form for homogeneous polynomial of degree 3 is

$$P_3 = ax^3 + bx^2y + cxy^2 + dy^3$$

where a, b, c, d are constants.
(i) [4pts] Find one explicit (particular) P_3 that is a harmonic function, i.e., a function statisfies

$$\Delta P_3 = 0.$$

Note: find an explicit one (like the one $P_2 = x^2 - y^2$ in lecture), not just derive some relation for coefficients.
(ii) [1pts] What is the dimension of the space of all P_3 that are harmonic functions.