Partial Differential Equations
Spring 2018

Assignment 16
Extra Problem

Exercise 1. Show that the following functions are harmonic, i.e. solve the Laplace equation $\Delta u = 0$. Feel free to use either Cartesian or polar coordinates, whichever seem more appropriate.

a. $u(x, y) = \dfrac{x^2 - y^2}{(x^2 + y^2)^2}$

b. $u(x, y) = x \log \sqrt{x^2 + y^2} - y \arctan\left(\dfrac{y}{x}\right)$

c. $u(x, y) = x^3 - 3xy^2$