

# **MAT 1060: Partial Differential Equations I**

## **Assignment 1, September 12 2007**

Read Chapter 1 and Chapter 2 up to p. 33. Look through p. 626-628 of Appendix C.

Please hand in to Wenbin Kong's mailbox by noon on Friday, September 21,

- Chapter 1 (p. 12-13): Problems 1, 2, 4.
- Chapter 2 (p. 85): Problems 1, 2.

including the additional problem:

- (*The Laplacian in polar coordinates.*)

Let  $u$  be a smooth real-valued function in two variables, and define

$$v(r, \theta) = u(r \cos \theta, r \sin \theta),$$

i.e.,  $v$  is obtained from  $u$  by transforming from Cartesian into polar coordinates. Express the Laplacian  $\Delta u$  in terms of derivatives of  $v$ .

*Hint:* First compute  $Dv(r, \theta)$  in terms of  $u$ .