

MATH 322 - SEC 001, SPRING 2013. HOMEWORK 4

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**Due : Wednesday, February 27**

Please show all your work and/or justify your answers for full credit.

**Problem 1:** (*Textbook problem 2.5.7*) Solve the Laplace's equation inside a  $60^\circ$  wedge of radius  $a$  subject to the boundary conditions

$$u(r, 0) = 0, \quad u\left(r, \frac{\pi}{3}\right) = 0, \quad u(a, \theta) = f(\theta)$$

**Problem 2:** (*Textbook problem 2.5.24*) Consider the velocity  $u_\theta$  at the cylinder. If the circulation is negative, show that the velocity will be larger above the cylinder than below.

**Problem 3:** (*Textbook problem 2.5.25*) A stagnation point is a place where  $\mathbf{u} = 0$ . For what values of the circulation does a stagnation point exist on the cylinder?