

COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electronics and Communications Engineering

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Course Title: Advanced Engineering Mathematics Spring 2015

Course No.: EC760 Problem Set #6

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Integrals: Green's Theory

1) Use Green's Theory to calculate the line integral around the anticlockwise contour $\oint_C F(r).dr$, where $F = [F1, F2]$:

a) $F = [x^2e^y, y^2e^x]$, C is a rectangle with vertices at $(0,0), (2,0), (2,3), (0,3)$

b) $F = [\sin y, \cos x]$, C is a triangle with vertices at $(0,0), (\pi, 0), (\pi, 1)$

Hint: visit this link, Example 1:

<http://tutorial.math.lamar.edu/Classes/CalcIII/GreensTheorem.aspx>

2) Laplace:

a) For the potential $V(x, y) = x^2 + y^2$, evaluate the area integral $\int_A \nabla^2 V(x, y) dA$ using Green's theory (i.e. use contour integral), over a triangle with vertices at $(0,0), (2,0), (2,3)$.

3) 2D FEM:

a) Evaluate the numerical value of the integral I_2 in the lecture notes for the 2D FE in problem Q4-part c, Sheet 5