MA 213 Worksheet #25

Section 16.4
29/11/18

1. *16.4.1,3* Evaluate the line integral by two methods: (i) directly and (ii) using Green's Theorem.

   (a) $\oint_C y^2\,dx + x^2 y\,dy$
   where C is the rectangle with vertices $(0,0), (5,0), (5,4)$, and $(0,4)$.

   (b) $\oint_C xy\,dx + x^2y^3\,dy$
   where C is the triangle with vertices $(0,0), (1,0)$, and $(1,2)$.

2. *16.4.7* Use Green's Theorem to evaluate

$$\oint_C (y + e^{\sqrt{x}})\,dx + (2x + \cos y^2)\,dy$$

   where C is the boundary of the region enclosed by the parabolas $y = x^2$ and $x = y^2$.

3. *16.4.13* Use Green's Theorem to evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$ where $\mathbf{F} = \langle y - \cos y, x \sin y \rangle$ and C is the circle $(x-3)^2 + (y+4)^2 = 4$ oriented clockwise.

4. *16.4.17* Use Green's Theorem to find the work done by the force $\vec{F}(x,y) = x(x+y)\vec{i} + xy^2\vec{j}$ in moving a particle from the origin along the x-axis to $(1,0)$, then along the line segment to $(0,1)$ and then back to the origin along the y-axis.