Math 241 Homework 11: Ch. 16

1. Calculate the following line integrals over the given curves.

   (a) $\displaystyle\int_C xy^2\,ds$ where C is the line segment joining $(0,0)$ and $(1,2)$.

   (b) $\displaystyle\int_C \sqrt{x}y\,ds$ where C is the line segment joining $(0,2)$ and $(1,-1)$.

   (c) $\displaystyle\int_C \sqrt{x^2+y^2}\,ds$ where C is the top half of the circle of radius 2 centered at the origin.

   (d) $\displaystyle\int_C \sqrt{xy+y+z}\,ds$ where C is the line segment joining $(0,0,1)$ and $(1,1,-2)$.

   (e) $\displaystyle\int_C (x^2\cos(y)+y)\,dx + (x^2\cos(y)-y)\,dy$ where C is the line segment from $(1,0)$ to $(0,1)$.

   (f) $\displaystyle\int_C (x-2y)\,dx + (2x+y)\,dy$ where C is the top half of the unit circle.

2. Use Greene's Theorem to evaluate the following line integrals.

   (a) $\displaystyle\oint_C \left(y^2+x^3-2x\right)\,dx + \left(2xy+x^2-3\cos(y^2+1)\right)\,dy$ where C is the triangle with corners $(0,0)$, $(2,2)$ and $(0,1)$, oriented anti-clockwise.

   (b) $\displaystyle\oint_C \left(y+\sin(x)\right)\,dx + \left(3x-y^3\cos(y)\right)\,dy$, where C is the anti-clockwise curve consisting of the line segment from $(0,0)$ to $(2,2)$, the portion of the circle $x^2+y^2=8$ from $(2,2)$ to $(-2,-2)$, and the line segment from $(-2,-2)$ to $(0,0)$.

   (c) $\displaystyle\oint_C \left(\cos(x)+\sin(y)-xy^3\right)\,dx + \left(x\cos(y)-x^2y^2+e^{y^2+1}\right)\,dy$, where C is the anti-clockwise oriented rectangle with vertices $(0,0)$, $(1,0)$, $(1,3)$ and $(0,3)$.

Extra Problems:

§16.1: 1-32, **§16.2:** 13-18, **§16.4:** 21-32