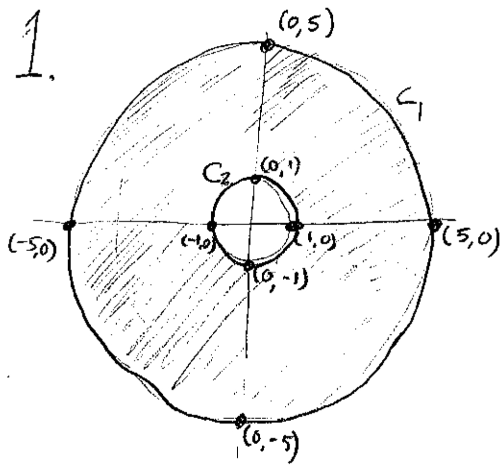
Green's Theorem

We will calculate the same thing 3 times and (hopefully) get the same thing all three times.

1.



(a) draw arrows on C_1 and C_2 so that the shaded region is on the left as you follow the arrows.

(b) Parameterize C_1

$r_1(t) = \langle \quad , \quad \rangle$

$\leq t \leq$

(c) Parameterize C_2

$r_2(t) = \langle \quad , \quad \rangle$

$\leq t \leq$

(d) check that your parameterizations follow the curves in the direction you intend them to.

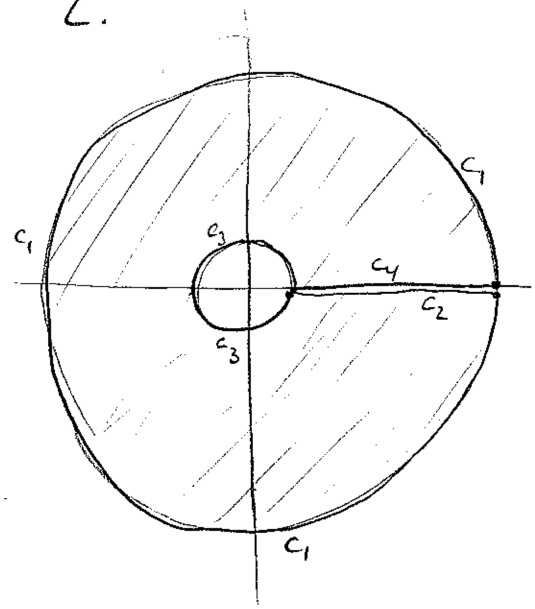
(e) calculate dx and dy for C_1

(f) calculate dx and dy for C_2

(g) set up the line integral $\int_{C_1+C_2} xy^2\,dx + x\,dy$ in terms of t.

(h) evaluate the integral.

2.



(a) draw arrows on c_1, c_2, c_3, c_4 so that the shaded region is on the left as you follow the arrows.

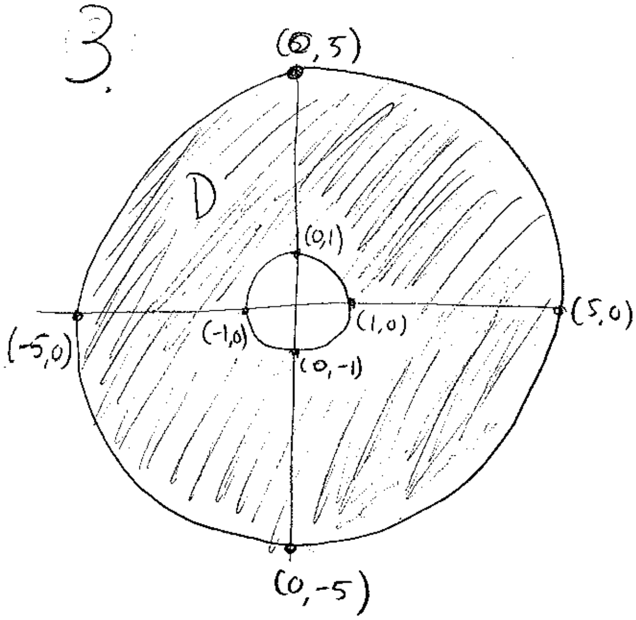
(b) write out $\int_c xy^2\,dx + x\,dy$ as four integrals (don't worry about "t"s just yet)

(c) what is the relationship between c_2 and c_4?

(d) using this information, rewrite $\int_c xy^2\,dx + x\,dy$

(e) Have you done this integral before? what is the answer?

3.



(a) in the previous problem, what were P and Q?

P =

Q =

(b) what is $Q_x - P_y$?

(c) we are going to integrate $\iint_D (Q_x - P_y)\,dA$. what coordinate system suits D the best?

(d) set up the integral

(e) evaluate the integral.

(f) is your answer the same as in number 1 & 2?