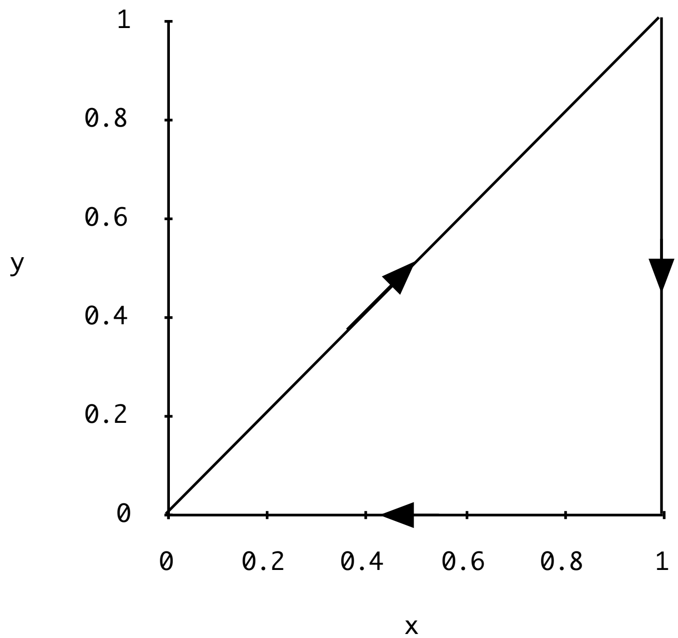
Math 213: Class 15 Green's Theorem Problems

1. Let C be the triangle path from (0,0) to (1,1) to (0,1) and back to (0,0).



Then $\int_C 2y\,dx - 3x\,dy$ equals (choose one)

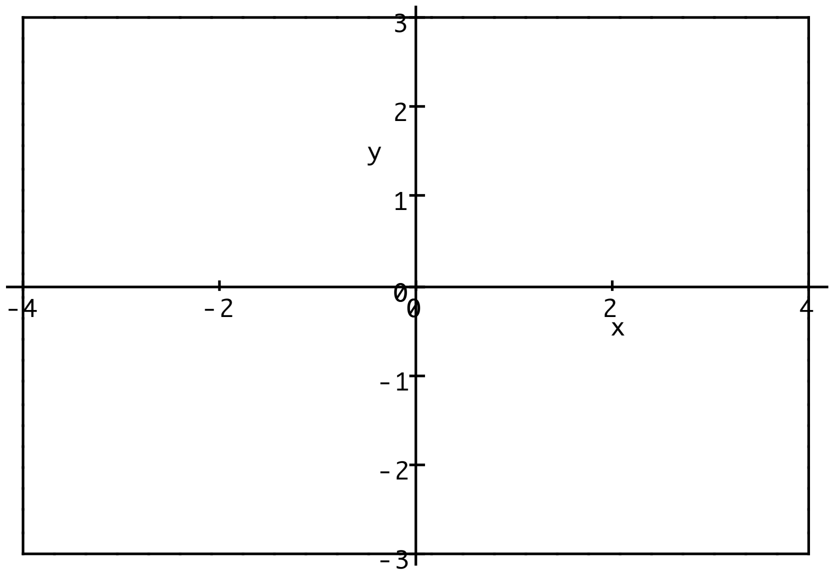
a. $\int_0^1\int_0^y \left[2-(-3)\right]dx\,dy$

b. $\int_0^1\int_0^1 \left[2-(-3)\right]dx\,dy$

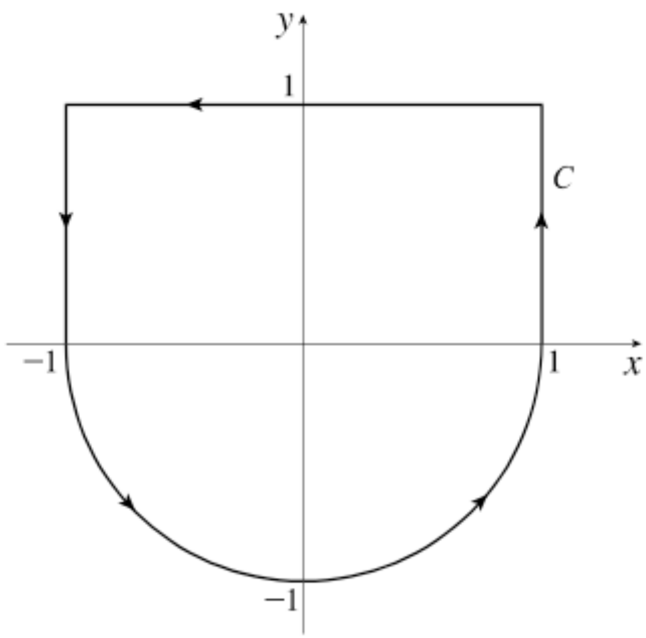
c. $\int_0^1\int_y^1 \left[-3-2\right]dx\,dy$

d. $\int_0^1\int_0^1 \left[-3-2\right]dx\,dy$

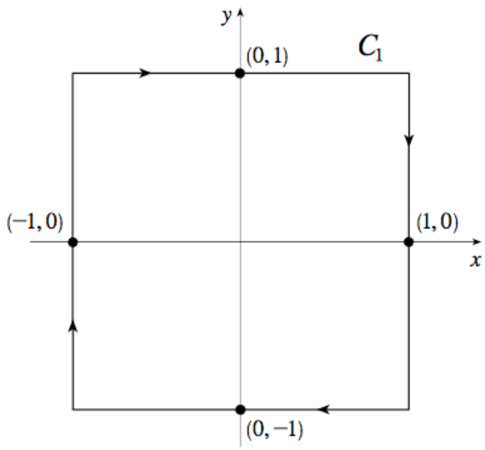
2. Use Green's Theorem to calculate $\int_C (y - x)\,dx + (2x - y)\,dy$ where C is the boundary of the rectangle shown below.

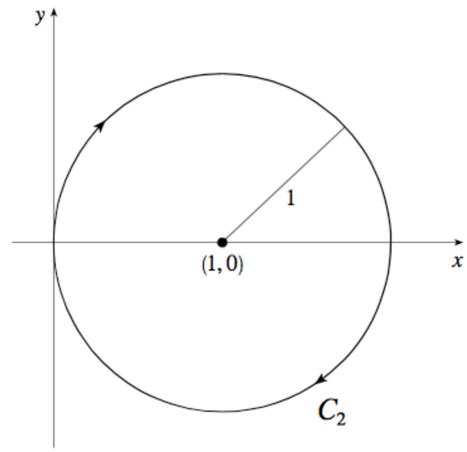


3. Compute $\oint_C \left(-\frac{xy^4}{2}\right) dx + \left(x^2 y^3\right) dy$ where C is the curve shown below.



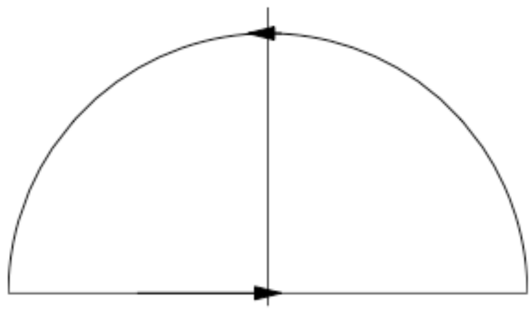
4. Compute $\oint_C \left(y^2 - 2y + 2xy\right)dx + \left(x^2 + 3x + 2xy\right)dy$ for the following curves C_1 and C_2 shown below.



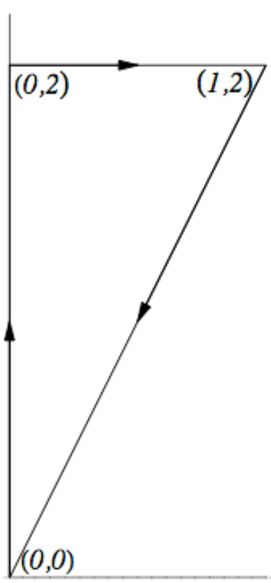


5. Use Green Theorem to evaluate the following line integrals

a. $\oint_C \left(\arctan\left(x^2\right) - y^2\right)dx + \left(x^2y - \ln\left(y^2+1\right)\right)dy$ where C is the semicircle $y = \sqrt{4 - x^2}$ together with the line segment from $(-2,0)$ to $(2,0)$ as shown.



b. $\oint_C xy\,dx + \left(x^2 + y^2\right)dy$ where C is the following triangle.



6. Consider the ***non-closed*** curve C which goes from (3,0) to (0,2) to (1,0) as shown below. Using Green's Theorem evaluate $\int_C (x+y)\,dx + (3x-y)\,dy$.