Section 18.1 Name: ____________

Math 1920 - Andres Fernandez November 20, 2018

Problems

(1) You are asked to compute the line integral of $\mathbf{F} = \langle 5y, 3\sin(y)\rangle$ over the path enclosing $\frac{5}{7}$ of a circle (oriented counterclockwise), as shown on the board. Use Green's theorem (otherwise it's a pain).

(2) Use Green's theorem to do the following computations

(a) The area of the ellipse $\left(\frac{x}{a}\right)^2 + \left(\frac{y}{a}\right)^2 = 1$

(b) The circulation of $\mathbf{F} = \langle y, 3x\rangle$ along the boundary of the of radius R centered at the point (4, 6).

(3) Suppose that you know the circulation of $\mathbf{F}$ along the boundary of the circle of radius 6 (oriented counterclockwise) is 20. What is the circulation along the circumference of radius 1 (oriented counterclockwise) if we know that $\frac{\partial}{\partial x}F_2 - \frac{\partial}{\partial y}F_1 = \cos(x^2 + y^2)$ on the annulus $1 \leq r \leq 6$?

(4) What is the flux of the vector field $\mathbf{F} = \langle 4x^3, 4y^3 - y^2\rangle$ across the boundary of the circle of radius 5 centered at the origin?