

MA 1130 : Assignment 1

1) Determine the area of the region bounded by the curves

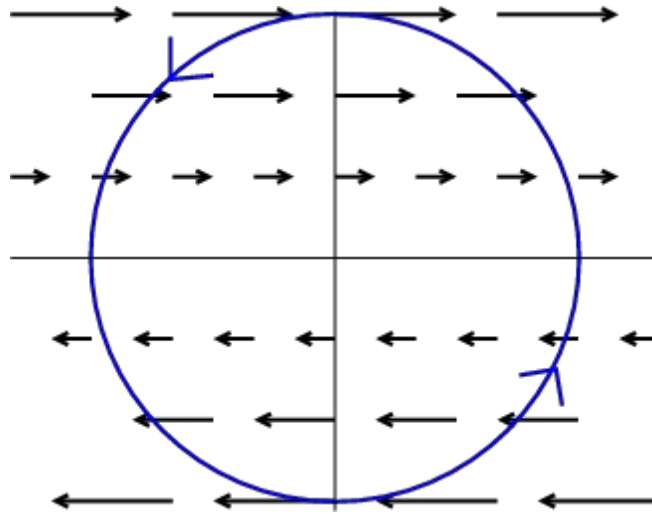
$$y = x \sqrt{x^2 + 1}$$

$$y = e^{-x/2}$$

$$x = -3$$

$$y - \text{axis}$$

2) Let $F = (y, 0)$ What is sign of the circulation of F around the anticlockwise-oriented unit circle? Calculate circulation exactly with Green's theorem where D is unit disk.



3) Convert the Cartesian integral into an equivalent polar integral. Then evaluate the polar integral.

$$\int_0^1 \int_x^{\sqrt{2-x^2}} (x + 2y) \, dx \, dy$$

4) Determine the volume of the solid obtained by rotating the region bounded by

$$y = \sqrt{x-1}$$

$$y = x - 1$$

and about the line

$$x = -1$$

5) Calculate $\operatorname{div}(\operatorname{curl}(\vec{F}))$ for the vector field

$$\vec{F} = yz^2\vec{i} + xy\vec{j} + yz\vec{k}$$