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MATB42: Assignment #6 Mar 6th 2018

1. Let $\omega = \dfrac{-y}{x^2+y^2}\,dx + \dfrac{x}{x^2+y^2}\,dy$. Calculate $\displaystyle\int_{\boldsymbol{\gamma}} \omega$ where

   (a) $\boldsymbol{\gamma}$ is the boundary of the triangle with vertices (in order) (0,1), (2,3) and (2,1).

   (b) $\boldsymbol{\gamma}$ is the boundary curve of the region $\left\{(x,y) \in \mathbb{R}^2 \,\middle|\, \dfrac{(x-2)^2}{9} + \dfrac{(y+1)^2}{4} \leq 1\right\}$ oriented in a counter clockwise direction

   (c) $\boldsymbol{\gamma}$ is the graph of the polar equation $r = 3 + 2\sin\theta$ oriented in the clockwise direction.

2. Let $\omega = (y^2 + z\ \ln 3)\,dx + (2xy + \sin z)\,dy + (y\cos z + (x+1)\ln 3)\,dz$.