MATB42: Assignment #6

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

- (a)  $\gamma$  is the boundary of the triangle with vertices (in order) (0,1), (2,3) and (2,1).
- (b)  $\gamma$  is the boundary curve of the region  $\left\{ (x,y) \in \mathbb{R}^2 \middle| \frac{(x-2)^2}{9} + \frac{(y+1)^2}{4} \le 1 \right\}$  oriented in a counter clockwise direction
- (c)  $\gamma$  is the graph of the polar equation  $r = 3 + 2\sin\theta$  oriented in the clockwise direction.
- 2. Let  $\omega = (y^2 + z \, \ln 3) \, dx + (2xy + \sin z) \, dy + (y \cos z + (x+1) \ln 3) dz$ .