

## Additional problem for Mean Value Property.

**(a)** Check that  $u(x, y) = xy$  is harmonic on  $\mathbb{C}$ . Show directly, by computing an integral along a generic circle of radius  $r$  centered at  $z_0$ , that  $u(x, y)$  does satisfy the Mean Value Property at any point on  $\mathbb{C}$ .

**(b)** Check that  $u(x, y) = x^2 + y^2$  is not harmonic on  $\mathbb{C}$ . Provide an example of the circle and compute an integral to show that  $u(x, y)$  does not satisfy the Mean Value Property at some point  $z_0$  on  $\mathbb{C}$ . (Hint: it will be easier if you consider  $z_0 = 0$ .)