

[gex21] **Constructing an analytic function from a harmonic function**

(a) Show that the following function is harmonic:

$$u(x, y) = e^{-x}(x \sin y - y \cos y).$$

(b) Construct its conjugate function  $v(x, y)$ .

(c) Assemble from the two conjugate functions the analytic function  $f(z) = u(x, y) + iv(x, y)$  and express it as a function  $z$  in the most concise way possible.

**Solution:**