MTH 317/617
Quiz #4

1. Let $f(z) = u(x,y) + iv(x,y)$ be an analytic function, where u, v are real valued functions of two variables. Define the real valued function $g(x,y)$ by

$$g(x,y) = \mathrm{Re}\left(e^{f(z)}\right).$$

Determine if $g(x,y)$ is a harmonic function and if so find its harmonic conjugate.

Hint: You do not need to calculate any derivatives or antiderivatives to do this problem.

Since f is analytic and the exponential function is analytic it follows that

$$g(x,y) = e^{u(x,y)}\cos(v(x,y))$$

is analytic. The harmonic conjugate is given by

$$h(x,y) = e^{u(x,y)}\sin(v(x,y)).$$