# Language and Speech Technology - Assignment 1

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September 9, 2019

## Part I

File can be found attached to the e-mail.

## Part II

### Assignment 3

**a.**

$x_1(t) = Re\{A_1 e^{i\phi_1} e^{i2\pi f_1 t}\}$
$x_2(t) = Re\{A_2 e^{i\phi_2} e^{i2\pi f_2 t}\}$

**b.**

$x_3(t) = Re\{A_1 e^{i(2\pi f_1 t + \phi_1)} + A_2 e^{i(2\pi f_2 t + \phi_2)}\}$
since $f_1 = f_2$
$x_3(t) = Re\{A_1 e^{i(2\pi f t)} + A_2 e^{i(2\pi f t + \phi_2)}\}$
$x_3(t) = Re\{e^{i(2\pi f t)}(A_1 e^{i\phi_1} + A_2 e^{i\phi_2})\}$

**c.**

$A_1(cos(\phi_1) + isin(\phi_1)) = 1.3(cos(0) + isin(0)) = 1.3$
$A_2(cos(\phi_2) + isin(\phi_2)) = 1.2(cos(0.9\pi) + isin(0.9\pi) = 1.2(-0.95 + 0.31i) = -1.14 + 0.37i$

**d.**

$z_D = 1.3 + 0i$
$z_E = -1.14 + 0.37i$
$z_D + z_E = 1.3 + (-1.14 + 0.37i) = 0.26 + 0.37i$

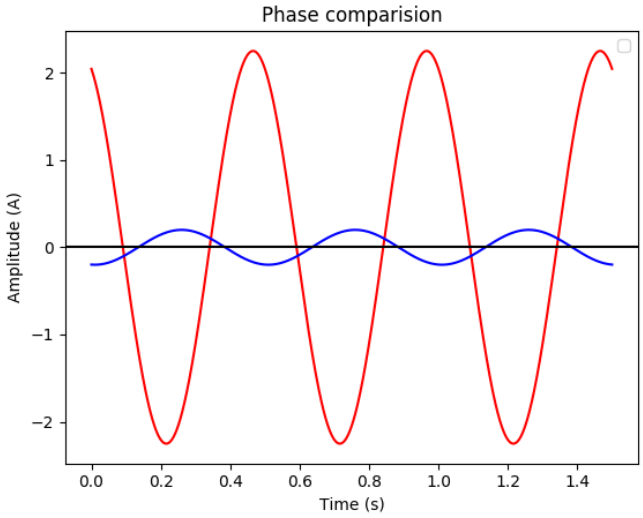
**e.**

$0.26 + 0.37i = r(cos(\theta) + isin(\theta))$
$r = 0.26^2 + 0.37^2 = 0.20$
$tan^{-1}(0.37/0.26) = 0.96$
$0.20(cos(0.96) + isin(0.96)) = 0.20e^{i0.96}$

**f.**

$x_3(t) = Re\{0.20e^{i0.96}e^{i(2\pi 20t)}\}$
$A_3 = 0.20$
$\phi_3 = 0.96$

## Assignment 4




## Assignment 5

**a**

$A_3 = (A_1cos(\phi_1) + A_2cos(\phi_2))^2 + (A_1sin(\phi_1) + A_2sin(\phi_2))^2$
$\phi_3 = tan^{-1}(\frac{A_1sin(\phi_1)+A_2sin(\phi_2)}{A_1cos(\phi_1)+A_2cos(\phi_2)})$

**b**

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