$$\omega_d = \omega_0\sqrt{1-\zeta^2}$$

$$f = A_1 e^{-\zeta\omega_d t_1}\sin\left(\omega_d t + \omega_d t_1\right)$$

$$g = A_2 e^{-\zeta\omega_d t_2}\sin\left(\omega_d t + \omega_d t_2\right)$$

$$f = A_1 e^{-\zeta\omega_d t_1}\sin\left(\omega_d t\right)\cos\left(\omega_d t_1\right) + A_1 e^{-\zeta\omega_d t_1}\cos\left(\omega_d t\right)\sin\left(\omega_d t_1\right)$$

$$g = A_2 e^{-\zeta\omega_d t_2}\sin\left(\omega_d t\right)\cos\left(\omega_d t_2\right) + A_2 e^{-\zeta\omega_d t_2}\cos\left(\omega_d t\right)\sin\left(\omega_d t_2\right)$$

$$u_1 = A_1 e^{-\zeta\omega_d t_1}\cos\left(\omega_d t_1\right)$$

$$v_1 = A_1 e^{-\zeta\omega_d t_1}\sin\left(\omega_d t_1\right)$$

$$u_2 = A_2 e^{-\zeta\omega_d t_2}\cos\left(\omega_d t_2\right)$$

$$v_2 = A_2 e^{-\zeta\omega_d t_2}\sin\left(\omega_d t_2\right)$$

$$u_1\sin\left(\omega_d t\right)+v_1\cos\left(\omega_d t\right)+u_2\sin\left(\omega_d t\right)+v_2\cos\left(\omega_d t\right) = \left(u_1+u_2\right)\sin\left(\omega_d t\right)+\left(v_1+v_2\right)\cos\left(\omega_d t\right)$$

$$A_{amp} = \sqrt{(u_1+u_2)^2+(v_1+v_2)^2}$$

$$A_{amp} = \sqrt{(\sum_{i=1}^{n} u_i)^2+(\sum_{i=1}^{n} v_i)^2}$$