Problem 10.22

Given, input to the C-D converter is:

$x(t) = 9 + 8\cos(1200\pi t) + 7\cos(600\pi t - 0.7\pi)$ and the system function for the LTI system is :

$H(z) = \frac{(1+z^{-1})(1-e^{j0.3\pi}z^{-1})((1-e^{-j0.3\pi}z^{-1})}{(1-0.8e^{j0.6\pi}z^{-1})(1-0.8e^{-j0.6\pi}z^{-1})}$ and $f_s = 4000$ samples/s.

Then, $x[n] = x(t)|_{n=t/f_s} = 9 + 8\cos(0.3\pi n) + 7\cos(0.15\pi n - 0.7\pi)$

$y[n]$ is evaluated by:

$y[n] = 9|H(e^{j0})| + 8|H(e^{j0.3\pi})|\cos(0.3\pi n) +$

$+7|H(e^{j0.15\pi})|\cos(0.15\pi n + \angle H(e^{j0.15\pi}) - 0.7\pi))$

$= 9(0.82443) + 8(0) + 7(2.640)\cos(0.15\pi n - 0.2155 - 0.7\pi)$.

Hence, the output of the D-C converter is: $y(t) = 7.41 + 18.48\cos(600\pi t - 0.2155 - 0.7\pi)$.