## Problem 4.22

(a) The sampling frequency should be greater than $2 \times f_{\max }$ of the signal. In the equation $f_{\max }=150 \mathrm{~Hz}$.
Hence, $f_{s}>300 \mathrm{~Hz}$.
(b) When Sampling rate $=f_{s}=250$ samples $/ \mathrm{s}$
$x[n]=2 \cos \left(2 \pi \frac{50}{250} n+\frac{\pi}{2}\right)+\cos \left(2 \pi \frac{150}{250} n\right)$
$=2 \cos \left(0.4 \pi n+\frac{\pi}{2}\right)+\cos (0.8 \pi n)$
(c) Spectrum:

(d) Given, output of the D-C converter is:
$y(t)=2 \cos \left(2 \pi(50) t+\frac{\pi}{2}\right)+1$. Required to find $f_{s}$.
Since the second term is 1 , implies the frequency corresponding to second term, 150 Hz is aliased. This occurs when $f_{s}=150 \mathrm{~Hz}$.

