

1. P6.3-5
2. P6.3-7a-i,iii, b
3. P6.4-1
4. P6.4-2
5. P6.6-7
6. For each set of couple differential equations where inputs are on the right side of the equations and outputs are on the left
 - a) draw the block diagram representation of the system of equations where $f(t)$ is the system input and $y(t)$ is the system output,
 - b) reduce the block diagram to one block containing the transfer function $H(s)=Y(s)/F(s)$,
 - c) use matlab to plot the system's impulse response ($y(t)$ for $f(t) = \delta(t)$) and step response ($y(t)$ for $f(t) = u(t)$) with time values from 0 to 10 seconds,
 - d) find the Fourier Transform transfer function $H(\omega)$ and plot the system's magnitude and phase spectra for frequencies between -20rad/sec and 20rad/sec.

i)
$$\begin{aligned}\dot{x} + 2x &= 2f \\ v &= x - r \\ \dot{y} + 4y &= 3v \\ \ddot{r} + 3r &= y\end{aligned}$$

ii)
$$\begin{aligned}\dot{v} + 4v &= \dot{r} \\ \dot{x} + 2x &= \dot{r} + r \\ y &= v - w \\ \dot{w} &= x \\ r &= f - y\end{aligned}$$