1) For the given set of differential equations,

\[
\begin{align*}
m_1 \ddot{x}_1(t) &= f - k_1 x_1 - b_1 \dot{x}_1 - b_3 (\dot{x}_1 - \dot{x}_2) - k_3 (x_1 - x_2) \\
m_2 \ddot{x}_2(t) &= -k_2 x_2 - b_2 \dot{x}_2 + b_3 (\dot{x}_1 - \dot{x}_2) + k_3 (x_1 - x_2)
\end{align*}
\]

Find the transfer functions between
a) F(s) and X_2(s)
 b) F(s) and (X_1(s)-X_2(s))

2) For the block diagram shown below, determine the transfer functions
a) G_{YU}
 b) G_{ZU}
 c) G_{XU}

by using block diagram algebra (the use of analytical technique will not be accepted).