1. Determine the unilateral Laplace transform of the following signals:
(a) $x(t)=e^{-2 t} u(t-1)$
(b) $x(t)=(\mathrm{u}(\mathrm{t}-1)-\mathrm{u}(\mathrm{t}-2))$
(c) $x(t)=\sin (100 t) u(t)$
(d) $x(t)=t(u(t)-u(t-1))$
2. Determine the causal inverse of the following Laplace transformations:
(a) $X(s)=\frac{1}{s^{2}+5 s+6}, R O C: \mathcal{R} e[s]>-3$
(b) $X(s)=\frac{s^{2}+2}{s^{2}+4}, R O C$ : whole $s$ plane
3. Is it possible to compute the transfer function and impulse response for the systems defined by the following differential equations? Derive the formula for each if possible.
(a) $y^{\prime \prime}(t)+y^{\prime}(t)-2 y(t)=2 x^{\prime}(t)+x(t)$, with $y(0)=0, y^{\prime}(0)=0, x(0)=1$
(b) $y^{\prime \prime \prime}(t)+2 y^{\prime \prime}(t)+3 y(t)=x(t) \quad$, with $y(0)=y^{\prime}(0)=0$
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[^0]:    - Assigned: Tuesday June 16, 2015
    - Deadline: Sunday June 21, 2015

