Automatic control

Sheet (1)

1- Find the Laplace transform of the following time functions:

(a) $y(t) = 7 + 5t$

(b) $c(t) = 3\ (1-e^{-t})$

(c) $f(t) = t^2 + 2 \sin 4t$

(d) $f(t) = -5\ e^{-3t} \cos 5t$

2- Find the inverse Laplace of the following system;

2-I) $F(s) = \dfrac{10}{(s+1)\ (s+2)}$

2-II) $F(s) = \dfrac{(s+5)}{s\ (s+1)\ (s+2)}$

3- Solve the following differential equation using Laplace transform;

3-I) $\dot{x}(t) + 2x(t) = 8$, where;

a) $x(0+) = 0$

b) Resolve when $x(0+) = 1$

3-II) $\ddot{x}(t) + 3\dot{x}(t) + 2x(t) = 6$, where; $x(0+) = 1$, and $\dot{x}(0+) = 0$

3-III) $\ddot{x}(t) + 2\dot{x}(t) + 2x(t) = 8$, where; $x(0+) = 0$, and $\dot{x}(0+) = 0$

3-IV) $\ddot{x}(t) + 4x(t) = 8$, where; $x(0+) = 0$, and $\dot{x}(0+) = 0$

4- Find the inverse Laplace of the following functions

4-I) $C(s) = \dfrac{2.25}{(s+3.5)(s^2+7s+12.25)}$

4-II) $C(s) = \dfrac{9}{s(s^2+2\ s\ +9)}$;

4-III) $C(s) = \dfrac{75}{(s^2+4s+13)(s+6)}$