Solving Differential Equations:

1. Solve the following differential equations using the Laplace Transform method:

a) $\dot{y} + 4y = 3x$; $x(t) = \sin(2t)$, $y(0) = 1$

b) $\ddot{y} + 4\dot{y} + 20y = 2\dot{x} - x$; $x(t) = u(t)$, $y(0) = 0$, $\dot{y}(0) = 1$

c) $\ddot{y} + 7\dot{y} + 12y = 6x$; $x(t) = u(t)$, $y(0) = 0$, $\dot{y}(0) = -2$

d) $\ddot{y} + 9\dot{y} + 20y = x(t)$, $y(0) = 1$, $\dot{y}(0) = -2$, $x(t) = 2u(t)$