Open book and open notes

Show your work for credit and place boxes around your answers.

***Extra Credit (1 point). Draw a Direct Form II block diagram for the following **<u>analog</u>** system described by

$$2y(t) + 4\frac{dy(t)}{dt} + 6\frac{d^2y(t)}{dt^2} = 8x(t) + 10\frac{dx(t)}{dt} + 12\frac{d^2x(t)}{dt^2}$$

Label **all** nodes with appropriate state space equations (hint: top node should be $q_1(t)$, DFII nodes can have up to 2 labels). Do **not** convert into integral form.

All gain blocks must have a numerical value. (hint 2: start from the feedback gains all the way to the output, $y(t)$, to figure out sign changes).

Note:
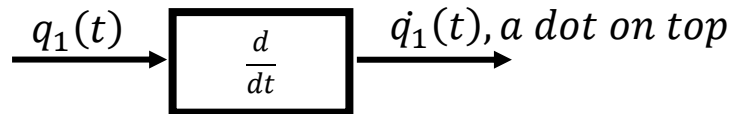
From above, determine the system's state equations in the form:

$$\dot{q}(t) = Aq(t) + Bx(t)$$
$$y(t) = Cq(t) + Dx(t)$$

Show each step in solving for the differential equations. Represent your answers in matrix form.