HOMEWORK 3 FOR MATH 2860 (ELEMENTARY DIFFERENTIAL EQUATIONS)

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Due at 10:00 EST in class

Question Q1. Rewrite the following differential equations in standard form and find the general solution using **variation of parameters**

$$t^2\dot{x} + x\sin(t) + \cos(t) = 0$$

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Question Q2. Rewrite the following differential equations in standard form and solve the IVP using **integrating factor** method.

$$t^2\frac{dx}{dt} + x(t) - 3 = 0 \quad x(1) = 1$$

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Question Q3. Solve the ODE using **exact equations** method or by finding an **integrating factor** if necessary.

$$(xy + x^3)\,dx + (\frac{x^2}{2} + y^2)\,dy = 0.$$

Question Q4. Determine whether the following ODE is "linear", "separable", "exact", "if it can be made exact". If it is exact or can be made exact with integration factor, solve it. If not, explain why.

$$(y - \ln(x)) \cdot y'(x) = 1 + \ln(x) + \frac{y}{x}.$$

Show all your work.

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