AMATH 353
Homework #1

These problems are intended to make you review prerequisite material.
Show your work to earn credit! Due on Wednesday, April 5, 2023.

1. Evaluate

$$y = \frac{\partial}{\partial x}\cos\left(e^{tx}\right) + \frac{\partial}{\partial t}\left[e^{2t}\sin\left(x-3t\right)\right] .$$

2. Find the general solution of the linear, first-order differential equation

$$\frac{dx}{dt} - \frac{2}{t}x = t^2\cos t$$

using an integrating factor.

3. Solve the initial-value problem

$$\frac{d^2y}{dx^2} - \frac{dy}{dx} - 12y = 0 , \quad y(0) = 2 , y'(0) = 1 .$$

4. Find the general solution of the linear, nonhomogeneous, second-order differential equation

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 5y = 5x + 6 .$$

Write your general solution in terms of real-valued (not complex-valued) functions.

5. Find the general solution of the linear, nonhomogeneous, second-order differential equation

$$\frac{d^2x}{dt^2} - 2\frac{dx}{dt} + x = e^t .$$