MATH 246 Groupwork 1.1 **Name:** _____

1. Solve the following first-order explicit DE:

$$y' - \cos(2t) = t$$

2. The following DE is not explicit but can be factored, resulting in two explicit DEs. Do this, and then solve each:

$$(y')^2 - t\cos(t^2)y' = 0$$

3. Find the specific solution to the following initial value problem:

$$y' - 2t = e^t \text{ with } y(0) = -2$$

4. Find the interval of existence of the solution to the IVP:

$$y' = \frac{t}{(t-1)(t-10)} \text{ with } y(3) = 5$$

5. Consider the first-order (non-exact) differential equation:

$$y' = \frac{t}{3y^2}$$

(a) Show that the general function $y = \left(\frac{1}{2}t^2 + C\right)^{1/3}$ is a solution to this for any constant C.

(b) Find the specific solution satisfying $y(0) = 2$.