Instructions:

1. Solve the following problems, simplifying the solution as much as you can.
2. AWE: Always Write Equations!
3. ADTSTTBSOTE: Always Do The Same Thing To Both Sides Of The Equation!
4. Your work should be organized and legible.
5. Use loose-leaf paper, not pages torn out from a spiral notebook.
6. Staple the pages together in the upper left-hand corner.
7. Write your name, "Math 527, section #" (with your correct section number), and "HW 1" in the upper-right corner of the first page.

Note: Work that is not written as equations will not be graded. Homeworks that are an effort to read will be returned ungraded. Five points will be deducted if your name is illegible. Two points each will be deducted for missing or incorrect section number, homework number, or staple.

Find the general solution of these separable ODEs. If an initial value is provided, also solve the initial value problem.

1. $\dfrac{dy}{dt} = 1 + t + y + y\,t$

2. $\dfrac{dy}{dx} = e^{x+y+3}$

3. $\dfrac{dy}{dt} = \dfrac{2t}{y + yt^2}, \quad y(2) = 3$

4. $\dfrac{dy}{dx} = \dfrac{3x^2 + 4x + 2}{2(y-1)}, \quad y(0) = -1$

5. $\cos y \, \sin t \, \dfrac{dy}{dt} = \sin y \, \cos t$

Find the general solution of these 1st order linear ODEs. If an initial value is provided, also solve the initial value problem.

6. $\dfrac{dy}{dt} + y \cos t = 0$

7. $\dfrac{dy}{dt} - 2ty = t, \ y(0) = 1$

8. $\dfrac{dy}{dx} + \dfrac{2x}{1+x^2}y = \dfrac{1}{1+x^2}$

9. $\dfrac{dy}{dt} + y = te^t$

10. $x\dfrac{dy}{dx} - y = x^2 \sin x$