Due Tuesday, Sept. 8th in recitation

Instructions:

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

Solve the differential equation using separation of variables. For #5 solve the initial value problem.

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

2. $\dfrac{dy}{dt} = 1 - t + y^2 - ty^2$

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

4. $\dfrac{dy}{dx} + 2xy^2 = 0$

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

Solve the 1st-order linear differential equation using an integrating factor. For #9 solve the initial value problem.

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

7. $\dfrac{dy}{dx} + \dfrac{2xy}{1 + x^2} = \dfrac{1}{1 + x^2}$

8. $(1 + t^2)\dfrac{dy}{dt} + ty = (1 + t^2)^{5/2}$

9. $\dfrac{dy}{dx} - 2xy = x, \quad y(0) = 1$

Find all solutions of the differential equation, both a family of solutions parameterized by an arbitrary constant and a singular solution.

10. $\dfrac{dy}{dx} = x\sqrt{1 - y^2}$