Instructions:

1. Solve the following problems, simplifying the solution as much as you can.

2. AWE: Always Write Equations!

3. Your work should be organized and legible.

4. Use loof-leaf paper, not pages torn out from a spiral notebook. 8 1/2 × 11 printing paper works well.

5. Staple the pages together in the upper left-hand corner.

6. Write your name, section number, "Math 527", and "HW 2" in the upper-right corner of the first page.

1 point out of 10 will be deducted for each instruction not followed. Homeworks that are an effort to read will be returned ungraded.

Find the general solutions of these ODEs

1. $\dfrac{dy}{dt} = e^{t+y+3}$

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

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

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

5. $\dfrac{dy}{dx} + y = xe^{x}$

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

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

Solve these initial value problems

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

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

9. $\dfrac{dy}{dt} = ky, \quad y(0) = y_0$

10. Show that the nonseparable equation

$$\dfrac{dy}{dt} = \dfrac{y - 5x}{x - y}$$

can be turned into separable equation in u and x by the substitution $u = y/x$. Find the general solution of this equation and then reexpress in terms of y and x alone.