Homework #2   **Math 527, UNH spring**
2013 Due Wednesday, Feb 6th in lecture

Instructions:

1. AWE: Always Write Equations!
2. Your work should be organized and legible.
3. Use loose-leaf paper, not pages torn out from a spiral notebook.
4. Staple the pages together in the upper left-hand corner.
5. Write your name, section number, "Math 527", and "HW 2" in the upper-right corner of the first page.

Five percentage points will be deducted for each of instructions 3-5 not followed. Homeworks that are an effort to read will be returned ungraded or with a substantial reduction.

Problems 1-5. Determine whether or not the given ODE is an "exact equation". If it is, find the solution. Solve for $y(x)$ to get an explicit solution if you can. Otherwise leave your answer as implicit solution.

1. $2x + (2y - 2)\dfrac{dy}{dx} = -3$

2. $\dfrac{dy}{dx} = \dfrac{5x + 4y}{8y^3 - 4x}$

3. $e^x \sin y - 2y \sin x + (e^x \cos y + 2 \cos x)\dfrac{dx}{dy} = 0$

4. $x \ln y + xy + (y \ln x + xy)\dfrac{dy}{dx} = 0, \quad x > 0$

5. $x - y^3 + y^2 \sin x - (3xy^2 + 2y \cos x)\dfrac{dy}{dx} = 0$

Problems 6-8. Use the given substitution to reduce the ODE to a separable or 1st-order linear ODE. **Do not solve the resulting ODE** unless you really, really want to.

Reduce this homogeneous* ODE to a separable ODE using the substitution $u = y/x$.

6. $\dfrac{dy}{dx} = \dfrac{y^2 + 2xy}{y^2}$

Reduce this Bernoulli ODE to 1st-order linear using a substitution of the form $u = y^{1-n}$.

7. $\dfrac{dy}{dx} = y(xy^3 - 1)$

Reduce this ODE to a separable ODE using a substitution of the form $u = Ax + By + C$.

8. $\dfrac{dy}{dx} = 1 + e^{y-x+5}$