

**MATH 246 Groupwork 1.8****Name:** \_\_\_\_\_

1. One of the following two differential equations is exact and the other will need an integrating factor. Solve both:

(a)  $(2y^3 + 2y) + (3xy^2 + x) \frac{dy}{dx} = 0$

(b)  $2xy^2 + (2x^2y + \sin(y)) \frac{dy}{dx} = 0$

2. Let's play a game titled: Design your own nonexact differential equation with nontrivial integrating factor! Just like when I was a kid!

Step 1: Choose some nontrivial  $H(x, y)$ .

Step 2: Create an exact differential equation by doing  $H_x + H_y \frac{dy}{dx} = 0$ .

Step 3: Make it non-exact by choosing some nontrivial  $\mu(x, y)$  and dividing it out of everything. Try to choose your  $H(x, y)$  so that when you divide out  $\mu(x, y)$  you get something not obvious.