Suggested problems 13

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1. Determine whether each of the given equations is exact. If it is exact, find the solution. Leave the answer in an implicit form.

   a) $(3x^2y^3 - 3x^2y + 2) + (3y^2x^3 - x^3 + 3)y' = 0$;

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

   c) $(x\ln y - y + 3x^2y)dx + (y\ln x - x + 3xy^2)dy = 0$.

2. Find the value of b for which the following equation is exact:

$$2e^x + x^5 + 3x^2y + \left(\sin y + bx^3 + \frac{1}{y^2+1}\right)\frac{dy}{dx} = 0.$$