Example 1. The following equation is not exact as presented, however you can multiply by the **integrating factor** $I = \frac{1}{x^3}$ then it will become exact. Find the general solution.

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

We learned about integrating factors very early in the course when we discussed linear first–order differential equations. It turns out that the integrating factor we had found way back then was really our means of turning the differential equatin into an **exact** equation! Unfortunately, in general, integrating factors can be hard to find.