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**Lab 2 - Exact First Order Differential Equations**

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Solve the given differential equations.

1.  $(2y + x)dy + ydx = 0$

$$2ydy + xdy + ydx = 0 \Rightarrow xdy + ydx = -2ydy \Rightarrow$$

$$d(xy) = -2ydy \Rightarrow \int d(xy) = \int -2ydy \Rightarrow$$

$$xy = -y^2 + C$$

2.  $xdy - ydx + y^2dx = 0$

$$y^2dx = ydx - xdy \Rightarrow dx = \frac{ydx - xdy}{y^2} \Rightarrow$$

$$dx = d\left(\frac{x}{y}\right) \Rightarrow \int dx = \int d\left(\frac{x}{y}\right) \Rightarrow$$

$$x = \frac{x}{y} + C \Rightarrow \frac{x}{y} = x - C \Rightarrow y = \frac{x}{x - C}$$