

Print your name: _____

Answer each question completely. You must justify your answers to get credit. Even a correct answer with no justification will get no credits. The problem is worth 10 points.

Find the general solution of the following separable first order ODEs.

1. $y' = 2xy$

Solution. We write $y' = \frac{dy}{dx}$ and separate the variables. Then we get

$$\frac{dy}{dx} = 2xy \Leftrightarrow \frac{1}{y} dy = 2x dx \Leftrightarrow \ln |y| = x^2 + C \Leftrightarrow y = e^{x^2+C} = De^{x^2}.$$

□

2. $y' = \frac{x}{y}$

Solution. We write $y' = \frac{dy}{dx}$ and separate the variables. Then we get

$$\frac{dy}{dx} = \frac{x}{y} \Leftrightarrow y dy = x dx \Leftrightarrow \frac{y^2}{2} = \frac{x^2}{2} + C \Leftrightarrow y = \pm \sqrt{x^2 + 2C} = \pm \sqrt{x^2 + D}.$$

□