

Worksheet: Homogeneous First Order Differential Equations

This worksheet has questions on homogeneous first order differential equations. Before attempting the questions below, you could read the study guide: [Homogeneous First Order Differential Equations](#).

Homogeneous
First Order
Differential Equations
study guide



Model Answers
to this worksheet



- Which of these first order ordinary differential equations are homogeneous?
 - $\frac{dy}{dx} = xy$
 - $y \frac{dy}{dx} = 4x$
 - $y' + \frac{2y^2}{x} = 0$
 - $\frac{dy}{dx} = \frac{x^2 + y^2}{4xy}$
 - $x^2 + yy' = 4x$
 - $x^2 y' + 2xy = 0$
- Show that the following first order ordinary differential equations are homogeneous:
 - $x^2 \frac{dy}{dx} = 2xy$
 - $\frac{dy}{dx} = \frac{y^2 + 4xy}{x^2}$
 - $x^2 yy' = x^3 + y^3$
- For the following first order ordinary differential equations, first check if they are homogenous and then find their **general solutions**.
 - $x \frac{dy}{dx} = 2y$
 - $\frac{dy}{dx} = \frac{2x^2 + y^2}{xy}$
 - $y' - \frac{y}{x} = 1$
- Find the **particular solution** to the following homogeneous first order ordinary differential equations:
 - $xy \frac{dy}{dx} - 4x^2 - y^2 = 0$ where $y(1) = 7$
 - $x \frac{dy}{dx} = y + x$ where $y(1) = 2$



This worksheet is one of a series on mathematics produced by the [Learning Enhancement Team](#).

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