

Worksheet: Linear First Order Differential Equations

This worksheet has questions on linear first order differential equations. Before attempting the questions below, you could read the study guide: [Linear First Order Differential Equations](#). Often, **ordinary differential equation** is shortened to ODE.

Linear First Order
Differential Equations
study guide



Model Answers
to this worksheet



- Classify the following ordinary differential equations (ODEs):
 - $\frac{dy}{dx} = xy + 3$
 - $\frac{dy}{dx} = 5y^2$
 - $y \frac{dy}{dx} = 4 + 2x$
 - $\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$
 - $y' = \frac{\sin(y)}{e^{2x}} + 1$
 - $y' + y \cos(x) + 2x = 0$
- Find the **general solution** to the following linear first order ODEs:
 - $\frac{dy}{dx} = 2x$
 - $\frac{dy}{dx} = \cos(x)$
 - $3 \frac{dy}{dx} - e^x = 0$
- Find the **general solution** to the following linear first order **separable** ODEs:
 - $x \frac{dy}{dx} = 2y$
 - $\frac{dy}{dx} = y \cos(x)$
 - $\frac{dy}{dx} - \frac{4e^x}{y} = 0$
- Find the **general solution** to the following linear first order ODEs:
 - $\frac{dy}{dx} + 4xy = e^{-2x^2}$
 - $x \frac{dy}{dx} = 2y + x^2$
 - $y' - \sin(2x) = -\frac{y}{x}$
- Find the **particular solution** to the following linear first order ODEs:
 - $\frac{dy}{dx} + 2xy = e^{-x^2}$ subject to the initial condition $y(0) = 2$
 - $x \frac{dy}{dx} = y + x^3$ subject to the boundary condition $y(1) = 5$



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

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