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Related problems on Homogeneous differential equations of first order and first degree

SUBJECT : (MATHEMATICS)
CHAPTER NUMBER: 09
CHAPTER NAME : Differential Equations

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Problems on Homogeneous differential Equations of first order and first degree

Show that the differential equation $x \cos\left(\frac{y}{x}\right)\frac{dy}{dx} = y\cos\left(\frac{y}{x}\right) + x$ is homogeneous and solve it.

Example

Show that the differential equation $2ye^{\frac{x}{y}}dy + \left(y - 2xe^{\frac{x}{y}}\right)dy = 0$ is homogeneous. Find the particular solution of this differential equation, given that $x = 0$, when $y = 1$.

Example

Show that the family of curves for which $\frac{dy}{dx} = \frac{x^2+y^2}{2xy}$ is given by $x^2 - y^2 = cx$.

Example

Solve the differential equation $y\left\{x\cos\left(\frac{y}{x}\right)+y\sin\left(\frac{y}{x}\right)\right\}dx-x\left\{y\sin\left(\frac{y}{x}\right)-x\cos\left(\frac{y}{x}\right)\right\}dy=0$

Example

Solve the differential equation $\left(1+e^{\frac{x}{y}}\right)dx+e^{\frac{x}{y}}\left(1-\frac{x}{y}\right)\mathrm{dy}=0.$

Example

Solve the differential equation $\left(1+e^{\frac{x}{y}}\right)dx+e^{\frac{x}{y}}\left(1-\frac{x}{y}\right)\mathrm{dy}=0.$

Example

Solve the initial value problem $2x^2\frac{dy}{dx} - 2xy + y^2 = 0, y(e) = e.$

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