Answer on Question #69601 – Math – Differential Equations

Question

Find the general solution of $y' - 2xy = 1$

Solution

$$y' + P(x)y = Q(x)$$

$$y = e^{-\int P(x)dx}\left(\int Q(x)e^{\int P(x)dx}\,dx + C\right)$$

$$\frac{dy}{dx} - 2xy = 1,\ P(x) = -2x,\quad Q(x) = 1$$

$$e^{-\int P(x)dx} = e^{-\int -2xdx} = e^{x^2}$$

$$e^{\int P(x)dx} = e^{\int -2xdx} = e^{-x^2}$$

$$y = e^{x^2}\cdot\left(\int e^{-x^2}\,dx + C\right)$$

$$\operatorname{erf}(x) = \frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}\,dt$$

$$y = e^{x^2}\cdot\left(\frac{\sqrt{\pi}}{2}\operatorname{erf}(x) + C\right)$$

Answer:

$y = e^{x^2}\cdot\left(\frac{\sqrt{\pi}}{2}\operatorname{erf}(x) + C\right)$.