©gunjimi Aleem Akinola
18/ENG04/060
Elect/Elect

Assignment

1) $\frac{dy}{dx} + y\tanh x = 2\sinh x$

Let $P = \tanh x$ and $Q = 2\sinh x$

$y \cdot IF = \int Q \cdot IF$

$IF = e^{\int P dx}$

$e^{\int \frac{\sinh x}{\cosh x} dx}$

$U = \cosh x$

$\frac{du}{dx} = \sinh x$

$IF = e^{\int \frac{F'x}{F(x)} dx}$

$IF = e^{\ln \cosh x} = \cosh x$

$y \cosh x = \int 2\sinh x \cdot \cosh x$

$y \cosh x = 2\int (\sinh x \cdot \cosh x)$

$Fx = \sinh x$, $F'x = \cosh x$

$y\cosh x = 2\int F(x) \cdot F'(x)$

$y\cosh x = 2\left[\frac{Fx^2}{2} + C\right]$

$y\cosh x = \frac{2\sinh^2 x}{2} + 2C$

$y\cosh x = \sinh^2 x + 2C$

$y = \frac{(\sinh x)^2}{\cosh x} + 2C(\cosh x)^{-1}$

$y = \sinh x \tan x + \frac{2C}{\cosh x}$

2) $\frac{dy}{dx} + 2y = e^{3x}$

Let $Q = e^{3x}$ and $P = 2$

$y \cdot IF = \int Q \cdot IF$

$IF = e^{\int P dx} = e^{2dx} = e^{2x}$

$ye^{2x} = \int e^{3x} \cdot e^{2x}$

$ye^{2x} = e^{5x} + C$

$y = e^{5x-2x} - Ce^{-2x}$

$y = e^{3x} + Ce^{-2x}$

3) $x\frac{dy}{dx} = x^2 + 2x - 3$

$\frac{dy}{dx} = x + 2 - 3/x$

$y = \int (x + 2 - 3/x) dx$

$y = x^2/2 + 2x - 3\ln x + C$

4) $\frac{dy}{dx} + \frac{y}{x} = y^3$

$y^{-3}\frac{dy}{dx} + 1/x\, y^{-2} = 1$ — — —

$z = y^{1-n}$

$z = y^{1-3} = y^{-2}$

$dz/dx = -2y^{-3}\frac{dy}{dx}$

Multiply x by -2

$-2y^{-3}\frac{dy}{dx} - (2/x)y^{-2} = -2$

$\frac{dz}{dx} - (2/x)z = -2$

$P_1 = -2/x$, $Q = -2$

$e^{\int P_1 dx}$ hence

$e^{\int -2/x dx} = e^{-2\int 1/x}$

$= e^{-2\ln x} = e^{\ln x^{-2}} = x^{-2}$

$z \cdot IF = \int Q \cdot IF$

$z \cdot x^{-2} = \int -2x^{-2}$

$z x^{-2} = \frac{-2x^{-2+1}}{-2+1}$

$2x^{-2} = x^{-1}$

$z = x^{-1} \cdot x^2$

$z = x$

$1/y^2 = x$

$y^2 = 1/x$

$y = \sqrt{1/x}$

5) $x^2 dy/dx = x^2 \sin 3x + 4$

$dy/dx = x\sin 3x + 4x^{-2}$

$y = \int (x\sin 3x + 4x^{-2})$

$y = \int x\sin 3x + \frac{4x^{-2+1}}{-2+1}$

$\int x\sin 3x = -x/3\cos 3x + \int \sin 3x \cdot 1$

$\int x\sin 3x = -x/3\cos 3x - 1/3\cos 3x + C$

$y = -x\cos 3x - 1\cos 3x - 2 + C$