GIE=SIE+GHE
GIE - general inhomogeneous equation
SIE - specific inhomogeneous equation
GHE - general homogeneous equation

$y' - \frac{3y}{x} = x$ ☺

General homogeneous equation:

$y' - \frac{3y}{x} = 0$

$\frac{dy}{dx} - \frac{3y}{x} = 0$

$\frac{dy}{dx} = \frac{3y}{x}$

$\int \frac{dy}{y} = \int 3 \cdot \frac{dx}{x}$

$\ln|y| + C_a = 3 \cdot \ln|x| + C_b$

$\ln|y| = 3 \cdot \ln|x| + (C_b - C_a)$

$\ln|y| = 3 \cdot \ln|x| + C_c$

$|y| = e^{3\ln|x| + C_c}$

$|y| = e^{3\ln|x|} \cdot e^{C_c}$, $e^{C_c} = C_*$

$|y| = C_1 e^{3\ln|x|}$

$y = \pm C_* e^{3\ln|x|}$, $\pm C_* = C$

$y = C \cdot e^{3\ln|x|}$ → ROZ

$y = C \cdot x^3$

Variation of constant C->C(x)

$y = C(x) \cdot x^3$

$y' = C'(x) \cdot x^3 + C(x) \cdot 3 \cdot x^2$

Podstawienie do ☺

$C'(x) \cdot x^3 + 3 \cdot C(x) \cdot x^2 - \frac{3 \cdot C(x) \cdot x^3}{x} = x$

$C'(x) \cdot x^3 + 3 \cdot C(x) \cdot x^2 - 3 \cdot C(x) \cdot x^2 = x$

$C'(x) \cdot x^3 = x \quad / : x^3$

$C'(x) = \frac{x}{x^3} = x \cdot x^{-3} = x^{-2} = \frac{1}{x^2}$

$C(x) = \int \frac{1}{x^2} \cdot dx$

$C(x) = \int x^{-2} \cdot dx = (-1) \cdot x^{-1} + C$

$C(x) = -\frac{1}{x} + C \rightarrow C(x) = -\frac{1}{x}$

$y = C \cdot x^3 + (-\frac{1}{x} + C) \cdot x^3$

$y = C \cdot x^3 - x^2$

GIE=SIE+GHE:

$y = C \cdot x^3 - x^2$

http://www.mbstudent.com/maths-examples.html