$$2x^2y'' + (y')^3 = 2xy' \qquad (2$$

$$2x^2v' + v^3 = 2xv \quad => \quad v' - \frac{1}{x}v = -\frac{1}{2x^2}v^3$$

$y' + P(x)y = y^n Q(x)$ (משוואת ברנולי: $n=0$ או $n=1$ משוואה לינארית)

פתרון: $y^{1-n} = \left[C + (1-n)\int Q(x)\, e^{\int (1-n)P(x)dx}\, dx\right] e^{-\int (1-n)P(x)dx}$

$n = 3 \quad => \quad 1 - n = -2 \quad , \quad P_{(x)} = -\frac{1}{x} \quad , \quad Q_{(x)} = -\frac{1}{2}x^{-2}$

$$v^{-2} = \left[C - 2\int -\frac{1}{2}x^{-2}e^{\int \frac{2}{x}dx}dx\right]e^{-\int \frac{2}{x}dx}$$

$$v^{-2} = \left[C + \int x^{-2}e^{\int \frac{2}{x}dx}dx\right]e^{-\int \frac{2}{x}dx}$$

$$v^{-2} = \left[C + \int x^{-2}e^{2\ln x}dx\right]e^{-2\ln x}$$

$$v^{-2} = \left[C + \int x^{-2}x^2dx\right]x^{-2}$$

$$v^{-2} = \left[C + \int dx\right]x^{-2}$$

$$v^{-2} = [C + x]x^{-2}$$

$$\left(\frac{dy}{dx}\right)^{-2} = \frac{x + C}{x^2} \quad => \quad \left(\frac{dx}{dy}\right)^{2} = \frac{x + C}{x^2} \quad => \quad \frac{dx}{dy} = \pm\frac{\sqrt{x + C}}{x}$$

$$dy = \pm\frac{x}{\sqrt{x + C}}dx \quad => \quad dy = \pm x\frac{1}{\sqrt{x + C}}dx$$

$$y = \pm \int x \frac{1}{\sqrt{x+C}} dx + D$$

$$\begin{cases} u = x & => \quad du = dx \\ dv = 2\dfrac{1}{2\sqrt{x+C}} dx & => \quad v = 2\sqrt{x+C} \end{cases}$$

$$\int x \frac{1}{\sqrt{x+C}} dx = 2x\sqrt{x+C} - 2\int \sqrt{x+C}\, dx$$

$$\int x \frac{1}{\sqrt{x+C}} dx = 2x\sqrt{x+C} - 2 \cdot \frac{2}{3}(x+C)^{3/2}$$

$$y = \pm \left[2x\sqrt{x+C} - \frac{4}{3}(x+C)^{3/2} \right] + D$$

$$y = \pm 2\sqrt{x+C} \left[x - \frac{2}{3}(x+C) \right] + D$$

$$y = \pm 2\sqrt{x+C} \left[\frac{1}{3}x - \frac{2}{3}C \right] + D$$

$$y = \pm \frac{2}{3}\sqrt{x+C}(x-2C) + D$$