۳۱

(مثال ۱۰۷ ص ۵۶)

$$y = xy'^{۲} + y'^{۳} = x\underbrace{p^{۲}}_{f} + \underbrace{p^{۳}}_{g}$$

حل: $$x' - \frac{f'(p)}{p - f(p)}\,x = \frac{g'(p)}{p - f(p)} \Rightarrow x' - \frac{۲p}{p - p^{۲}}\,x = \frac{۳p^{۲}}{p - p^{۲}}$$

$$\boxed{x' + \frac{۲}{p-۱}\,x = \frac{۳p}{۱-p}}$$

$$\mu(p) = e^{\int \frac{-۲}{p-۱}dp} = e^{۲Ln(p-۱)} = e^{Ln(p-۱)^{۲}} = (p-۱)^{۲}$$

$$x = \frac{۱}{\mu(p)}\left(\int \mu(p)\cdot q(p)\,dp + c\right)$$

$$x = \frac{۱}{\mu(p)}\left(\int \cancelto{۱-p}{(p-۱)^{۲}}\,\frac{۳p}{۱-p}\,dp + c\right)$$

$$x = \frac{۱}{(p-۱)^{۲}}\left(\int ۳p - ۳p^{۲}\,dp + c\right) = \frac{۱}{(p-۱)^{۲}}\left(\frac{۳p^{۲}}{۲} - p^{۳} + c\right)$$

$$\begin{cases} y = xp^{۲} + p^{۳} \\ x = \dfrac{۱}{(p-۱)^{۲}}\left(\dfrac{۳p^{۲}}{۲} - p^{۳} + c\right) \end{cases}$$

$$\begin{cases} y = \dfrac{p^{۲}}{(p-۱)^{۲}}\left(\dfrac{۳p^{۲}}{۲} - p^{۳} + c\right) \\ x = \dfrac{۱}{(p-۱)^{۲}}\left(\dfrac{۳p^{۲}}{۲} - p^{۳} + c\right) \end{cases}$$

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