TUGAS MATEMATIKA 2
Jilid 1

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POLITEKNIK ELEKTRONIKA NEGERI SURABAYA

Soal dan Jawaban !

1. $(2u+4y)+(2u-2y)y'=0$

   $\mapsto$ Gunakan penyelesaian menggunakan u

   $= (2u+4y)+(2yu-2y^2)=0$

   $\Rightarrow 2u+2yu = -4y+2y^2$

   $\rightarrow (2+2y)u = -4y+2y^2$

   $u = \dfrac{-4y+2y^2}{2+2y}$

   $u = \dfrac{-4y+2y^2}{2+2y}$

   $u = \dfrac{-2y+y^2}{1+y}$

2. $(2uy^2+2y)+(2u^2y+2u)y'=0$

   $\mapsto (2uy^2+2y)+(2u^2y+2u)y'=0$

   $= (2y^2u+2y)+(2yu^2+2u)y'=0$

   $= 2y^2u+2y+2y^2u^2+2yu=0$

   $= 2y(yu+1+yu^2+u)=0 \longrightarrow 2y(yu+1+u(yu+1))=0$

   $= 2y(yu+1)(1+u)=0$

   $= (yu+1)(1+u)=0$

   $\mapsto yu+1=0 \Leftrightarrow u=\dfrac{-1}{y}$

   $\qquad 1+u=0 \longrightarrow u=-1$

3. $3u\dfrac{dy}{du}=u^3+2u^2-3u+5$

   $\mapsto 3u\dfrac{dy}{du}=u^3+2u^2-3u+5$

   $\Rightarrow 3u\dfrac{dy}{du}=u^3+2u^2-3u+5, d\neq 0, u\neq 0$

   $\Rightarrow 3u\dfrac{y}{u}=u^3+2u^2-3u+5$

   $\Rightarrow 3uy=u^4+2u^3-3u^2+5u$

   $\Rightarrow y=\dfrac{u^4+2u^3-3u^2+5u}{3u}, 3u\neq 0 \rightarrow u\neq 0$

   $\Rightarrow y=\dfrac{u(u^3+2u^2-3u+5)}{3u}, u\neq 0$

   $\Rightarrow y=\dfrac{(u^3+2u^2-3u+5)}{3}, u\neq 0$

   $\Rightarrow y=\dfrac{u^3+2u^2-3u+5}{3}, u\neq 0, d\neq 0$

4. $e^u \frac{dy}{du} = 2e^{3u} + 4$

$\quad \hookrightarrow$ Gunakan penyelesaian u

$\Rightarrow e^u \frac{dy}{du} = 2e^{3u} + 4$

$\Rightarrow e^u \frac{dy}{du} = 2e^{3u} + 4$

$\Rightarrow e^u \, dy = (2e^{3u} + 4) du$

$\Rightarrow dy = \frac{2e^{3u} + 4}{e^u} du$

$\Rightarrow \int dy = \int \frac{2e^{3u} + 4}{e^u} du$

$\Rightarrow y + C_1 = e^{2u} - \frac{4}{e^u} + C_2 . \ C_1 \in R, C_2 \in R$

$\Rightarrow y = e^{2u} - \frac{4}{e^u} + C, \ C \in R$

5. $\frac{dy}{du} = \frac{uy^2 + y^2}{2e^2 y - u^2}$

$\quad \hookrightarrow \frac{dy}{du} = \frac{uy^2 + y^2}{2e^2 y + u^2}$

$\Rightarrow \frac{dy}{du} = \frac{uy^2 + y^2}{2e^2 y + u^2}, \ d \neq 0, \ u \neq 0, \ y \neq 1$

$\Rightarrow \frac{y}{u} = \frac{y^2(u+1)}{u^2(y-1)}$

$\Rightarrow u(y-1)y = uy^2 + y^2$

$\Rightarrow uy^2 - uy = uy^2 + y^2$

$\Rightarrow -uy = y^2$

$\Rightarrow -uy - y^2 = 0$

$\Rightarrow -y(u+y) = 0$

$\Rightarrow y = 0, \ u + y = 0 \longrightarrow y = 0, \ y = -u$