

A. PDB Orde 1

Tentukan solusi persamaan-persamaan differensial berikut

1. $\frac{dy}{dx} + y^2 \sin x = 0$
2. $\frac{dy}{dx} = \frac{x^2}{y(1+x^3)}$
3. $x \frac{dy}{dx} = \sqrt{1-y^2}$
4. $\frac{dy}{dx} = (1-2x)y^2, \quad y(0) = -\frac{1}{6}$
5. $\frac{dr}{d\theta} = \frac{r^2}{\theta}, \quad r(1) = 2$
6. $\frac{dy}{dx} = \cos^2 x \cos^2 2y$
7. $y^2 \sqrt{1-x^2} dy = \arcsin x dx, \quad y(0) = 0$

Tentukan apakah persamaan-persamaan berikut eksak atau tidak. Jika eksak, selesaikan

8. $(e^x \sin y + \tan y) dx + (e^x \cos y + x \sec^2 y) dy = 0$
9. $(\cos x + \ln|y|) dx + \left(\frac{x}{y} + e^y\right) dy = 0$
10. $\left(\frac{2x}{y} - \frac{3y^2}{x^4}\right) dx + \left(\frac{2y}{x^3} - \frac{x^2}{y^2} + \frac{1}{\sqrt{y}}\right) dy = 0$

Tentukan solusi persamaan-persamaan differensial berikut

11. $y' = (1-y) \cos x$
12. $(1+x)y' + y = \cos x$
13. $y' = 2xy + 3x^2 e^{x^2}$
14. $(x^2 + 4)y' + 3xy = x$
15. $(1-4xy^2)y' = y^3$
16. $(1+2xy)y' = 1+y^2$

Tentukan solusi persamaan-persamaan differensial berikut

17. $x^2 y'' + 2xy' - 1 = 0$
18. $y'' + x(y')^2 = 0$
19. $y'' + y' = e^{-x}$
20. $xy'' + y' = 1$
21. $2x^2 y'' + (y')^3 = 2xy$
22. $yy'' + (y')^2 = 0$
23. $y'' + y(y')^2 = 0$

24. $yy'' - (y')^3 = 0$
25. $y'' + y = 0$
26. $2y^2y'' + 2y(y')^2 = 1$
27. $\frac{dy}{dx} = -\frac{1}{x^2} - \frac{y}{x} + y^2, \quad y_1 = \frac{1}{x}$
28. $\frac{dy}{dx} = \frac{2 \cos^2 x - \sin^2 x + y^2}{2 \cos x}, \quad y_1 = \sin x$

Selesaikan persamaan-persamaan differensial berikut

29. $x dx + y dy = (x^2 + y^2) dx$
30. $(2y - 3x)dx + x dy = 0$
31. $(x - y^2) dx + 2xy dy = 0$
32. $x dy - y dx = 3x^2(x^2 + y^2) dx$
33. $y dx - x dy + \ln x dx = 0$
34. $(3x^2 + y^2) dx - 2xy dy = 0$
35. $(x + y)dx - (x - y)dy = 0$

B. PDB Orde 2

Carilah solusi dari persamaan differensial berikut

1. $y'' - 5y' + 6y = 0$
2. $y'' + 4y' + 5y = 0$
3. $y'' - 10y' + 25y = 0$

Carilah solusi dari persamaan differensial berikut

4. $y'' - 5y' + 6y = x^2$
5. $y'' - 5y' + 6y = e^{5x}$
6. $y'' - 5y' + 6y = e^{2x}$
7. $y'' - 5y' + 6y = \cos 2x$

Carilah solusi dari persamaan differensial berikut

8. $y'' + 4y = \cos 3x$
9. $y'' + 4y = \sin 2x$
10. $y'' + 2y' + y = e^{3x} + x + 1$
11. $y'' - 2y' = x^2 + 1$

Carilah solusi dari persamaan differensial berikut

12. $y'' - 6y' + 9y = 6e^{3x} + 5e^{2x} - 9$
13. $y'' + 4y' + 4y = x^2$
14. $y'' + 2y' = 1 + x^2$

15. $y'' + 4y = \cos 2x$
16. $y'' - 4y' + 4y = x^2 e^{2x}$
17. $y'' - 6y' + 13y = 8e^{3x} \sin 4x + 2^x$
18. $y'' + y = x^2 \sin x$
19. $y'' - 2y' + y = xe^x \sin x$

C. Transformasi Laplace

Evaluasi integral-integral berikut

1. $\int_0^{\infty} e^{-st} t^2 dt$
2. $\int_0^{\infty} e^{-st} \cos(bt) dt$

Tentukan transformasi laplace berikut

3. $\mathcal{L}[\sin(t - 4) u(t - 4)]$
4. $\mathcal{L}[(t - 4)^2 u(t - 4)]$

Selesaikan persamaan-persamaan differensial berikut menggunakan transformasi laplace

5. $y'' - y' - 6y = 0, \quad y(0) = 1, y'(0) = -1$
6. $y'' - 2y' + 2y = e^{-x}, \quad y(0) = 0, y'(0) = 1$
7. $y'' + 4y = g(x)$
 - a. $g(x) = \begin{cases} 1, & 0 < x < \pi \\ 0, & x \geq \pi \end{cases}, \quad y(0) = 1, y'(0) = 0$
 - b. $g(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 \leq x < 2 \\ 0, & x \geq 2 \end{cases}, \quad y(0) = 0, y'(0) = 0$

D. Invers Transformasi Laplace

Tentukan invers transformasi laplace dari fungsi-fungsi berikut

1. $F(s) = \frac{s}{(s - 2)(s - 3)}$
2. $F(s) = \frac{s^2}{(s - 2)(s - 3)(s - 4)}$
3. $F(s) = \frac{s}{(s - 2)(s - 3)^2}$
4. $F(s) = \frac{s^2}{[(s - 2)^2 + 9](s - 4)}$