Separable Differential Equations Answers

Solve the Differential Equation

1. $\frac{dy}{dx}=\frac{7x^2}{y^3},\ \ y(3)=2$ $\quad y=\sqrt[4]{\frac{28x^3}{3}-236}$

2. $\frac{dy}{dx}=5x^2y,\ \ y(0)=6$ $\quad y=6e^{\frac{5x^3}{3}}$

3. $y'=\frac{1}{y+x^2y},\ \ y(0)=2$ $\quad y=\sqrt{2\tan^{-1}(x)+4}$

4. $y'=\frac{e^x}{y^2},\ \ y(0)=1$ $\quad y=\sqrt[3]{3e^x-2}$

5. $\frac{dy}{dx}=\frac{y^2}{x^3},\ \ y(1)=2$ $\quad y=2x^2$

6. $y'=\frac{\sin x}{\cos y},\ \ y(0)=\frac{3\pi}{2}$ $\quad y=\sin^{-1}(-\cos x)$

7. $\frac{dy}{dx}=\frac{x^2}{y^2},\ \ y(0)=2$ $\quad y=\sqrt[3]{x^3+8}$

8. $\frac{dy}{dx}=x^2y,\ \ y\left(\sqrt[3]{3}\right)=-e$ $\quad y=-e^{\frac{x^3}{3}}$

9. $\frac{dy}{dx}=\frac{e^{2x}}{4y^3}$ $\quad y=\pm\sqrt[4]{\frac{1}{2}e^{2x}+C}$

10. $\left(x^2+1\right)y'=xy$ $\quad y=k\sqrt{x^2+1},\ \ K=\pm e^C$

11. $y'=y^2\sin x$ $\quad y=\frac{1}{\cos x+K},\ \ K=-C$

12. $\frac{dy}{dx}=y^2+1,\ \ y(1)=0$ $\quad y=\tan(x-1)$

13. $y'=\frac{3-x}{y},\ \ y(0)=-4$ $\quad y=-\sqrt{-x^2+6x+16}$

14. $\frac{dy}{dx}=\frac{3x^2+1}{2y},\ \ y(1)=-4$ $\quad y=-\sqrt{x^3+x+14}$

15. $\frac{dy}{dx}=\frac{3x^2+1}{2y},\ \ y(1)=4$ $\quad y=\sqrt{x^3+x+14}$

16. $\frac{dy}{dx}=\frac{y-1}{x^2},\ \ y(2)=0$ $\quad y=-e^{-\frac{1}{x}+\frac{1}{2}}+1$

17. $\frac{dB}{dt}=\frac{1}{5}(100-B),\ \ B(0)=20$ $\quad B=-80e^{-\frac{1}{5}t}+100$

18. $\frac{dy}{dx}=\frac{3x^2}{y},\ \ y(2)=-8$ $\quad y=-\sqrt{2x^3+48}$

19. $\frac{dy}{dx}=\left(1-\frac{2}{x^2}\right)(y-1),\ \ y(1)=2$ $\quad y=e^{x+\frac{2}{x}-3}+1$

20. $\frac{dy}{dx}=\frac{x}{y},\ \ y(3)=-1$ $\quad y=-\sqrt{x^2-8}$

21. B
22. E
23. E
24. A
25. E
26. C
27. A
28. B