Ch 10 Review

Pg 540

3. $\frac{dy}{dt} = t^2 y^{-3}$

$y^3 dy = t^2 dt$

$\frac{1}{4} y^4 = \frac{1}{3} t^3 + C$

$y^4 = \frac{4}{3} t^3 + C$

$y = \pm \sqrt[4]{\frac{4}{3} t^3 + C}$

4. $xyy' = 1 - x^2$

$y \frac{dy}{dx} = \frac{1-x^2}{x}$

$\int y \, dy = \int \frac{1}{x} - \frac{x^2}{x} \, dx$

$\int y \, dy = \int \frac{1}{x} - x \, dx$

$\frac{1}{2} y^2 = \ln|x| - \frac{1}{2} x^2 + C$

$y^2 = 2\ln|x| - x^2 + C$

$y^2 = \ln x^2 - x^2 + C$

$y = \pm \sqrt{\ln x^2 - x^2 + C}$

5. $x\frac{dy}{dx} - y = 1$

$x\frac{dy}{dx} = y + 1$

$\int \frac{1}{y+1}\,dy = \int \frac{1}{x}\,dx$

$\ln|y+1| = \ln|x| + C$

$e^{\ln|x|+C} = y+1$

$e^{\ln|x|} \cdot e^{C} - 1 = y$

$y = Cx - 1$

9. $y' = xy^2 \quad y(1) = 2$

$\frac{1}{y^2}\frac{dy}{dx} = x$

$\int y^{-2}\,dy = \int x\,dx$

$-1y^{-1} = \frac{1}{2}x^2 + C$

$y^{-1} = -\left(\frac{1}{2}x^2 + C\right)$

$y = \frac{-1}{\frac{1}{2}x^2 + C}$

$2 = \frac{-1}{\frac{1}{2}(1)^2 + C}$

$2 = \frac{-1}{\frac{1}{2} + C}$

$2\left(\frac{1}{2} + C\right) = -1$

$1 + 2C = -1$

$2C = -2$

$C = -1$

$y = \frac{-1}{\frac{1}{2}x^2 - 1}$

10. $xyy' = 1$ $\quad y(3) = 2$

$y\frac{dy}{dx} = \frac{1}{x}$

$\int y\,dy = \int \frac{1}{x}dx$

$\frac{1}{2}y^2 = \ln|x| + C$

$y^2 = 2\ln|x| + C$

$y^2 = \ln x^2 + C$

$y = \pm\sqrt{\ln x^2 + C}$

Since $y(3) = +2$ only need $+\sqrt{}$

$2 = \sqrt{\ln(3)^2 + C}$

$2 = \sqrt{\ln 9 + C}$

$4 = \ln 9 + C$

$4 - \ln 9 = C$

$y = \sqrt{\ln x^2 + 4 - \ln 9}$

$y = \sqrt{\ln\left(\frac{x^2}{9}\right) + 4}$

AP10 - 1

#1 $y' = 2y$ $\quad y(0) = 6$

$\frac{dy}{dx} = 2y$

$\int \frac{1}{y}\, dy = \int 2\, dx$

$\ln|y| = 2x + C$

$y = e^{2x+C}$

$y = Ce^{2x}$

$6 = Ce^{2(0)}$

$6 = C(1)$

$C = 6$

$y = 6e^{2x}$ C

4. $y' + 4y = 0$

$\frac{dy}{dx} = -4y$

$\int \frac{1}{y}\, dy = \int -4\, dx$

$\ln|y| = -4x + C$

$e^{-4x+C} = y$

$y = Ce^{-4x} = \frac{C}{e^{4x}}$ C

possible value for C

$C = 1/4$

then

$y = \frac{1}{4e^{4x}}$

14. $\frac{dy}{dx} = x + y$

Quad ① dy/dx ⊕

Quad ③ dy/dx ⊖

Quad ② and ④ signs of $\frac{dy}{dx}$ change

at $(-2, 2)$ $\frac{dy}{dx} = 0$

$(-1, 1)$
$(1, -1)$
$(2, -2)$

B

15. Along vertical lines slope does not change ∴ dy/dx does not depend on y

when x ⊕ dy/dx ⊕ $y' = x$

When x ⊖ dy/dx ⊖ C

20. Along vertical lines slope does not change dy/dx does not depend on y

dy/dx always ⊕ or zero

$y' = x^2$ C