

Find the solution of the differential equation  $dy/dt = ky$ ,  $k$  a constant, that satisfies the given conditions.

7)  $y(0) = 350, y(40) = 119$

$t=0, y=350$

Evaluate the integral.

8)  $\int \frac{200 dx}{x^3 - 25x}$

$t=40, y=119$

9)  $\int \frac{2x + 23}{x^2 + 11x + 28} dx$

Solve the differential equation.

10)  $\frac{dy}{dx} = \frac{x^5}{x^3 - 16x}$

$y = Pe^{kt}$

$350 = Pe^{k(0)}$

$350 = P$

$119 = 350e^{k(40)}$

$\ln \frac{119}{350} = 40k$   
 $\ln \left( \frac{119}{350} \right) = \frac{40k}{40}$

7)  $k = \frac{\ln \left( \frac{119}{350} \right)}{40}$

8) \_\_\_\_\_

9) \_\_\_\_\_

10) \_\_\_\_\_

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7)  $y(0) = 350, y(40) = 119$

Evaluate the integral.

8)  $\int \frac{200 dx}{x^3 - 25x}$

$$\int \frac{200}{x^3 - 25x} = \int \frac{A}{x} + \frac{B}{x+5} + \frac{C}{x-5} = \int \frac{-8}{x} + \frac{4}{x+5} + \frac{4}{x-5}$$

$x(x^2 - 25)$  or  $x(x+5)(x-5)$

9)  $200 = A(x+5)(x-5) + B(x)(x-5) + C(x)(x+5)$

$x=5; \quad 200 = 50C$   
 $C=4$

$x=-5 \quad 200 = 50B$   
 $B=4$

$x=0 \quad 200 = -25A$   
 $A=-8$



$-8 \ln|x| + 4 \ln|x+5| + 4 \ln|x-5| + C$

$$9) \int \frac{2x+23}{x^2+11x+28} dx = \int \frac{2x+23}{(x+7)(x+4)} = \int \frac{A}{x+7} + \frac{B}{x+4}$$

$$2x+23 = A(x+4) + B(x+7)$$

$$\left. \begin{array}{l} x=4; \\ 15 = 3B \\ B=5 \end{array} \right\} \begin{array}{l} x=-7; \\ 9 = -3A \\ A=-3 \end{array}$$

$$= \int \frac{5}{x+7} - \frac{3}{x+4} dx$$

$$5 \ln|x+7| - 3 \ln|x+4|$$

$$\ln \left| \frac{(x+7)^5}{(x+4)^3} \right| + C$$

8) \_\_\_\_\_

9)

$$x^3 - 16x \overline{) \begin{array}{r} x^5 + 0x^4 + 0x^3 + 0x^2 + 0x + 0 \\ - (x^5 - 16x^3) \\ \hline \end{array}} \quad \left. \begin{array}{l} x^2 + 16 \\ x^2 + \frac{32}{x+4} + \frac{32}{x-4} \end{array} \right\} dx$$

Solve the differential equation.

10)  $\frac{dy}{dx} \int \frac{x^5}{x^3 - 16x}$

$$= x^2 + \frac{16x^3}{x^3 - 16x} = x^2 + \frac{16x^3}{x(x^2 - 16)} = \frac{A}{x} + \frac{B}{x+4} + \frac{C}{x-4}$$

$$16x^3 = A(x+4)(x-4) + B(x)(x-4) + C(x)(x+4)$$

$x=0;$

$0 = -16A$   
 $A = 0$

$$\left. \begin{array}{l} x = -4; \\ 1024 = 32B \\ B = 32 \end{array} \right\} \left. \begin{array}{l} x = 4 \\ 1024 = 32C \\ C = 32 \end{array} \right\}$$

$\frac{1}{3}x^3 + \ln|x+4|^{32} + \ln|x-4|^{32}$

done correctly by 😊

Solve the differential equation.

$$10 \frac{dy}{dx} \left( \frac{x^5}{x^3 - 16x} \right)$$

$$\int \frac{x^5}{x^3 - 16x} = \int \frac{x^2 + 16 + \frac{256x}{x^2 - 16x}}{x^3 - 16x}$$

$$\frac{256x}{x(x+4)(x-4)} = \frac{A}{x} + \frac{B}{x+4} + \frac{C}{x-4} = 256x = A(x+4)(x-4) + B(x)(x-4) + C(x)(x+4)$$

$$= x^2 + 16 + \frac{32}{x+4} + \frac{32}{x-4} + C$$

$$y = \frac{1}{3}x^3 + 16x + \ln|x+4|^{32} + \ln|x-4|^{32}$$

$$x^3 - 16x \overline{) x^5 + 0x^4 + 0x^3 + 0x^2 + 0x + 0}$$

$$- (x^5 - 16x^3)$$

$$\hline 16x^3$$

$$- (16x^3 - 256x)$$

$$\hline 256x$$

$$x=4: 1024 = 32C \quad C=32$$

$$x=-4: -1024 = -32B \quad B=32$$

$$A=0$$