- 1. Find the particular solution of the differential equation 3x + 20yy' = 0 that satisfies the initial condition y = 5 when x = 2, where $3x^2 + 20y^2 = C$ is the general solution. 3(2)+20(5)=6
 - a. $3x^2 + 20y^2 = 504$
 - b. $3x^2 + 20y^2 = 155$
 - c. $3x^2 + 20y^2 = 112$
 - d. $3x^2 + 20y^2 = 37$
 - e. $3x^2 + 20y^2 = 512$
- 12+ 500 = 6 c=512

Use integration to find a general solution of the differential equation $\frac{dy}{dx} = \frac{3x}{3+x^2}$. a. $y = \frac{3}{2} \ln(|3 + x^2|) + C$ b. $y = \frac{3}{2x} \ln(|6+x^2|) + C$ c. $y = \frac{6}{x^2} \ln \left(\left| 3 + x^2 \right| \right) + C$ d. $y = \frac{3}{x \ln\left(\left|3 + x^2\right|\right)} + C$ e. $y = \frac{3x^2}{\ln(|3+x^2|)} + C$

3. Use integration to find a general solution of the differential equation $\frac{dy}{dx} = 13x \cos\left(8x^2\right)$.

$$a. \quad y = \frac{13x \sin\left(16x^2\right)}{2x} + C$$

b.
$$y = \frac{13x \cos(8x^2)}{16} + C$$

$$\int_{C} y = \frac{13\sin\left(8x^2\right)}{16} + C$$

$$d. \quad y = \frac{13\cos\left(8x^2\right)}{16x} + C$$

$$e. \quad y = \frac{13\sin\left(16x^2\right)}{4} + C$$

 $(Ay = ||3x \cos(8x)Ax du = |6xdx d$

Use integration to find a general solution of the differential equation.

$$\frac{dy}{dx} = x\sqrt{x+2} \qquad \begin{cases} dy = \int x\sqrt{x+2} dx \end{cases}$$

a.
$$y = \frac{2}{5}(x+2)^{3/2} - \frac{4}{3}(x+2)^{5/2} + C$$

b.
$$y = \frac{2}{5}(x+2)^{3/2} - (x+2)^{5/2} + C$$

$$(x+2)^{5/2} - \frac{4}{3}(x+2)^{3/2} + 6$$

d.
$$y = \frac{2}{5}(x+2)^{3/2} + \frac{4}{3}(x+2)^{5/2} + C$$

e.
$$y = \frac{2}{5}(x+2)^2 - \frac{4}{3}(x+2) + C$$

a. $y = \frac{2}{5}(x+2)^{3/2} - \frac{4}{3}(x+2)^{5/2} + C$ b. $y = \frac{2}{5}(x+2)^{3/2} - (x+2)^{5/2} + C$ c. $y = \frac{2}{5}(x+2)^{5/2} - \frac{4}{3}(x+2)^{3/2} + C$

$$y = \frac{2}{5}(x+2)^{2.5} - \frac{4}{3}(x+2)^{1.5} + 6$$

5. Use integration to find a general solution of the differential equation.

$$\frac{dy}{dx} = x\sqrt{4 - x^2}$$

a.
$$y = -\frac{1}{3}x(4-x^2)^{\frac{3}{2}} + C$$

b.
$$y = -\frac{1}{5}x(4-x^2)^{\frac{5}{2}} + C$$

c.
$$y = -\frac{1}{3} \left(4 - x^2 \right)^{\frac{3}{2}} + C$$

d.
$$y = \frac{1}{5}x(4-x^2)^{\frac{5}{2}} + C$$

e.
$$y = \frac{1}{3} \left(4 - x^2 \right)^{\frac{3}{2}} + C$$

$$dy = x_1 - x^2 + 4 dx \qquad dv = -2x dx$$

$$\int dy = \int x_1 - y dx - \frac{1}{2} dv = x dx$$

$$y = -\frac{1}{2} \left(\frac{2}{3} v^{1.5} \right) + C_1$$

$$y = -\frac{1}{3} \left(\frac{2}{3} v^{1.5} \right) + C_1$$

$$y = -\frac{1}{3} \left(\frac{2}{3} v^{1.5} \right) + C_1$$

6. Solve the differential equation.

$$\frac{dy}{dx} = -y - 8 \qquad \int \frac{dy}{y+8} = -\int dx$$

a.
$$y = Ce^{-x} + 8$$

b. $y = Ce^{x} - 8$
c. $y = Ce^{x} + 8$
 $y = Ce^{x} + 8$
 $y = Ce^{-x} + 8$
 $y = Ce^{-x} + 8$

b.
$$v = Ce^{x} - 8$$

c.
$$y = Ce^{x} + 8$$

d.
$$y = Ce^{-x} - 8$$

e.
$$y = Ce^x + 16$$

7. Solve the differential equation $y' = \frac{\sqrt{x}}{-5y}$.

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

a.
$$4y^2 = -15x^{\frac{3}{2}} + C$$

$$\int y \, dy = -\frac{1}{5} \int x^{\frac{1}{2}} \, dx$$

b.
$$4y^2 = -5x^{\frac{3}{2}} + C$$

$$30\left[\frac{1}{2}y^2 = -\frac{1}{5}\left(\frac{2}{3}x^{\frac{3}{2}}\right) + C\right]$$

c.
$$-5y^2 = 4x^{\frac{3}{2}} + C$$

(d.)
$$-15y^2 = 4x^{\frac{3}{2}} + C$$

e.
$$-15y^2 = 2x^{\frac{3}{2}} + C$$

8. Solve the differential equation.

$$y' = x(1+y)$$

a.
$$\ln|1+y| = x^2 + C$$

b.
$$3 \ln |1 + y| = x^3 + C$$

c.
$$4 \ln |1 + y| = x^4 + C$$

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

(e)
$$2\ln|1+y| = x^2 + C$$

$$\frac{dy}{dx} = x(i+y)$$

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

$$2\left[\ln\left(1+\gamma\right)\right] = \frac{1}{2}x^2 + C$$

9. Find the function y = f(t) passing through the point

$$(0,15)$$
 with the first derivative $\frac{dy}{dt} = \frac{1}{4}t$.

(a.)
$$y(t) = \frac{t^2}{8} + 15$$

b.
$$v(t) = 8t^2 + 15$$

c.
$$v(t) = 4t + 15$$

d.
$$y(t) = \frac{t^2}{4} + 15$$

e.
$$y(t) = \frac{t}{4} + 15$$

$$\int dy = \frac{1}{4} \int t \, dt$$

$$Y = \frac{1}{4} \left(\frac{1}{2} t^2 \right) + C$$

$$15 = \frac{1}{8}(0)^2 + C$$

$$\gamma(t) = \frac{1}{8}t^2 + 15$$

10. Find the function y = f(t) passing through the point

0. Find the function
$$y = f(t)$$
 passing through the point $(0,12)$ with the first derivative $\frac{dy}{dt} = \frac{6}{7}y$.

a. $y(t) = e^{\frac{6}{7}t^2} + 12$

b. $y(t) = \frac{6}{7}t^2 + 12$

c. $y(t) = 12e^{\frac{6}{7}t^2}$

ln $y = \frac{6}{7}t^2 + 12$

ln $y = \frac{6}{7}t^2 + 12$

ln $y = \frac{6}{7}t^2 + 12$

e. $y(t) = e^{\frac{6}{7}t} + 12$

a.
$$y(t) = e^{\frac{6}{7}t^2} + 12$$

b.
$$y(t) = \frac{6}{7}t^2 + 12$$

$$\frac{6}{7}t^2$$

d.
$$y(t) = 12e^{\frac{6}{7}}$$

e.
$$y(t) = e^{\frac{6}{7}t} + 12$$

$$\int \frac{d\gamma}{\gamma} = \int \frac{6}{7} dt$$

$$l_{12} = \frac{6}{5} (0) + C$$
 $c = l_{12}$

$$y = 12e^{\frac{6}{7}t}$$

11. Write and solve the differential equation that models the following verbal statement. Evaluate the solution at the specified value of the independent variable, rounding your answer to four decimal places:

The rate of change of V is proportional to V. When s = 0, V = 60 and when s = 4, V = 116. What is the value of V when s = 12?

(a.) V(1

V(12) = 433.5822

- b. V(12) = 437.3322
- c. V(12) = 424.6622
- d. V(12) = 439.7922
- e. V(12) = 429.8322

#= kV V= Ce^H V= 60e^H 116 = 60e^H e^H = 166 41 = 10166 + = hills V= 60e^{In} 186 V= 60e^{In} 186 (12,433.582)

- 12. The half-life of the radium isotope Ra-226 is approximately 1,599 years. If the initial quantity of the isotope is 38 g, what is the amount left after 1,000 years? Round your answer to two decimal places.
 - (a.) 24.63 g
 - b. 30.60 g
 - c. 25.13 g
 - d. 11.88 g
 - e. 12.32 g

 $Y = A_0\left(\frac{1}{2}\right)^{\frac{1}{h}}$

Y≈24.63

- The half-life of the radium isotope Ra-226 is approximately 1,599 years. What percent of a given amount remains after 400 years? Round your answer to two decimal places.
 - $\gamma = 100\left(\frac{1}{2}\right)^{\frac{1}{10049}}$ $\gamma \approx 84.08$ 84.08 %
 - 12.51 %
 - 86.08 % d. 0.84 %
 - e. 5.84 %

14. Find the general solution of the differential

equation
$$\frac{dy}{dx} = \frac{5x^2}{8y^2}$$
.

equation
$$\frac{dy}{dx} = \frac{5x^2}{8y^2}$$
. $\int 8 y^2 dy = \int 5 x^2 dx$

a.
$$y = \frac{5}{8}x^3 + C$$

$$y = \sqrt[3]{\frac{5}{8}x^3 + C}$$

c.
$$y = \sqrt{\frac{8}{5}x^3 + C}$$

d.
$$y = \sqrt[3]{\frac{x^2}{8} + C}$$

e.
$$y = \sqrt[3]{5x^3 + 8C}$$

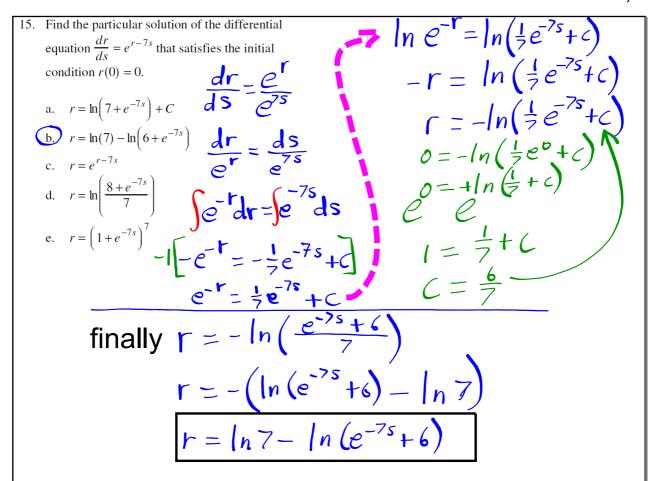
a.
$$y = \frac{5}{8}x^3 + C$$

b. $y = \sqrt[3]{\frac{5}{8}x^3 + C}$ $\frac{3}{8}\left[\frac{8}{3}\right] \times 3 = \frac{5}{3} \times 3 + C$

c.
$$y = \sqrt{\frac{8}{5}x^3 + C}$$
 $y = \frac{8}{8}x^3 + C$

$$\gamma = \sqrt[3]{\frac{s}{R} \times^3 + C}$$

6 - test.notebook March 03, 2022



16. Find an equation of the graph that passes through the point (7, 3) and has the slope $y' = \frac{5y}{2x}$.

a. $y = 3(7x)^{\frac{2}{5}}$ b. $y = xe^{\frac{5}{2} + \frac{7}{3}}$ c. $y = 3\left(\frac{x}{7}\right)^{\frac{5}{2}}$ d. $y = 7\left(\frac{5x}{2}\right)^3$ e. $y = \frac{2}{5x} - \ln(7x) + 3$ let $y = \frac{5}{2} \ln x + c$ $y = \ln x^{\frac{5}{2}} + c$ $y = \ln x^{\frac$

- The number of bacteria in a culture is increasing according to the law of exponential growth. After 5 hours there are 175 bacteria in the culture and after 10 hours there are 425 bacteria in the culture. Answer the following y=cekt questions, rounding numerical answers to four decimal places. (3, 175)
 - (i) Find the initial population.
 - (ii) Write an exponential growth model for the bacteria population. Let *t* represent time in hours.
 - (iii) Use the model to determine the number of bacteria after 20 hours.
 - (iv) After how many hours will the bacteria count be 15,000?

$$\frac{1}{175} = \frac{175}{e^{5k}}$$

$$\frac{1}{25} = \frac{175}{e^{5k}}$$

$$\frac{175}{e^{5k}} = \frac{175}{e^{5k}}$$

$$\frac{175}{e^{5k}} = \frac{175}{e^{5k}}$$

$$\frac{175}{e^{5k}} = \frac{175}{e^{5k}}$$

$$\frac{175}{e^{5k}} = \frac{106}{e^{5k}}$$

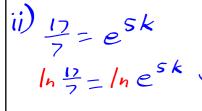
$$\frac{175}{e^{5k}} = \frac{106}{e^{5k}}$$

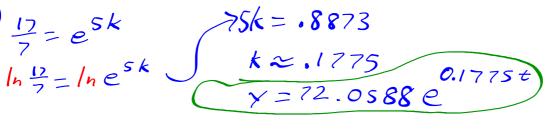
$$\frac{17}{7} = e^{5k}$$

$$\frac{17}{7} = e^{5k}$$

(10, 425)

- The number of bacteria in a culture is increasing according to the law of exponential growth. After 5 hours there are 175 bacteria in the culture and after 10 hours there are 425 bacteria in the culture. Answer the following questions, rounding numerical answers to four decimal places.
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- 1. The number of bacteria in a culture is increasing according to the law of exponential growth. After 5 hours there are 175 bacteria in the culture and after 10 hours there are 425 bacteria in the culture. Answer the following questions, rounding numerical answers to four decimal places.
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- iii) $y = 72.0588e^{0.1775t} t = 20$ $y = 72.0588e^{0.1775(20)} \approx 2508.6059$

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iv)
$$y = 72.0588 e$$
0.1775 t
15000 = 72.0588 e
 $t \approx 30.075$