

1. Verify the solution of the differential equation.

Solution

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

Differential Equation

$$y'' + 2y' = 2e^x$$

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2. Verify that the general solution satisfies the differential equation.
Then find the particular solution that satisfies the initial condition.

$$3x^2 + 2y^2 = C$$

$$3x + 2yy' = 0$$

$$y = 3 \text{ when } x = 1$$

3. Geologists have determined that Crater Lake in Oregon was formed by a volcanic eruption. Chemical analysis of a wood chip that is assumed to be from a tree that died during the eruption has shown that it contains approximately 30% of its original carbon-14. Determine how long ago the volcanic eruption occurred. Use 5730 years as the half-life of carbon-14.

4. Solve the homogeneous differential equation.

$$y' = \frac{x - y}{x + y}$$

5. Find the general solution of the differential equation.

a. $xy' = y$

b. $yy' = 6\cos(\pi x)$

6. Find the particular solution that satisfies the initial condition.

a.

$$y\sqrt{1-x^2}y' - x\sqrt{1-y^2} = 0$$

$$y(0) = 1$$

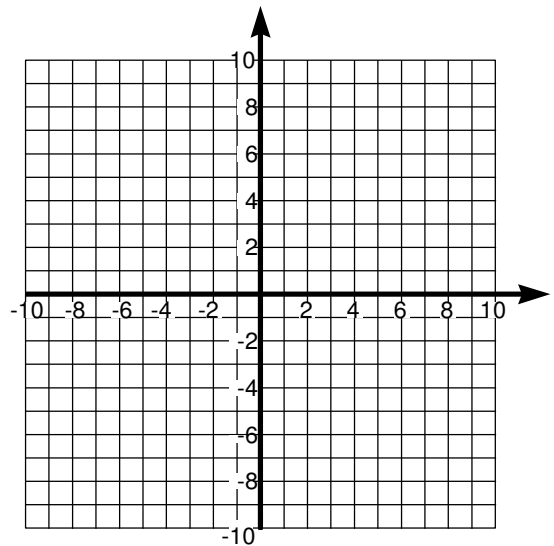
b.

$$\frac{dr}{ds} = e^{r-2s}$$

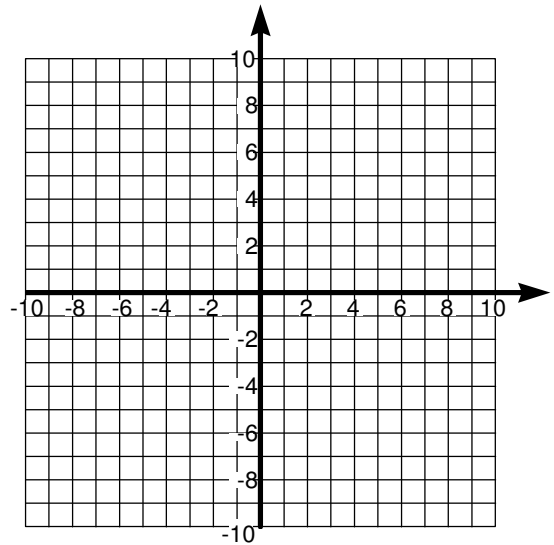
$$r(0) = 0$$

7. Sketch the region bounded by the graphs of the algebraic functions and find the area of the region.

a. $f(x) = \sqrt[3]{x-1}$, $g(x) = x-1$



b. $f(y) = y^2$, $g(y) = y + 2$



8. Set up and evaluate the definite integral that gives the area of the region bounded by the graph of the function and the tangent line to the graph at the given point.

$$y = x^3 - 2x, (-1, 1)$$

