Differential equations 1

Solve each differential equation.

1. $\frac{dy}{dx} = x + 2$
2. $\frac{dy}{dx} = 4 - x$
3. $\frac{dy}{dx} = y + 2$
4. $\frac{dy}{dx} = 4 - y$
5. $y' = \frac{5x}{y}$
6. $y' = \frac{\sqrt{x}}{3y}$
7. $y' = y\sqrt{x}$
8. $y' = x(1 + y)$
9. $(1 + x^2)y' - 2xy = 0$
10. $\frac{dy}{dx} = \frac{y}{x}$

Find the function $y = f(t)$ passing through the point $(0,10)$.

11. $\frac{dy}{dt} = \frac{1}{2}t$
12. $\frac{dy}{dt} = -\frac{3}{4}\sqrt{y}$
13. $\frac{dy}{dt} = \frac{3}{4}y$

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Answers

1. $y=\frac{1}{2}x^2+2x+C$
2. $y=4x-\frac{1}{2}x^2+C$
3. $y=Ce^x-2$
4. $y=4+Ce^{-x}$
5. $y^2=5x^2+C$
6. $y^2=\frac{4}{9}x^{3/2}+C$
7. $y=Ce^{2/3x^{3/2}}$
8. $y=Ce^{\frac{1}{2}x^2}-1$
9. $y=C\left(1+x^2\right)$
10. $y=C|x|$
11. $y=\frac{1}{4}t^2+10$
12. $y=\left(\frac{-3}{8}t+\sqrt{10}\right)^2$
13. $y=10e^{3/4t}$

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