

微分方程 分離係數法

Consider the differential equation $\frac{dy}{dx} = y^2(2x + 2)$. Let $y = f(x)$ be the particular solution to the differential equation with initial condition $f(0) = -1$.

Find $y = f(x)$, the particular solution to the differential equation with initial condition $f(0) = -1$.

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

ANS

2013 AP Calculus BC

習作

Consider the differential equation $\frac{dy}{dx} = e^y(3x^2 - 6x)$. Let $y = f(x)$ be the particular solution to the

1. differential equation that passes through $(1, 0)$.

Find $y = f(x)$, the particular solution to the differential equation that passes through $(1, 0)$.

$$y = -\ln(-x^3 + 3x^2 - 1)$$

Note: This solution is valid on an interval containing

ANS $x = 1$ for which $-x^3 + 3x^2 - 1 > 0$.

2013 Calculus AB

Consider the differential equation $\frac{dy}{dx} = (3 - y)\cos x$. Let $y = f(x)$ be the particular solution to the differential equation with the initial condition $f(0) = 1$. The function f is defined for all real numbers.

- (a) A portion of the slope field of the differential equation is given below. Sketch the solution curve through the point $(0, 1)$.
 - (b) Write an equation for the line tangent to the solution curve in part (a) at the point $(0, 1)$. Use the equation to approximate $f(0.2)$.
2. (c) Find $y = f(x)$, the particular solution to the differential equation with the initial condition $f(0) = 1$.

$$ANS \quad y = 3 - 2e^{-\sin x}$$

2014 Calculus AB

3. Consider the differential equation $\frac{dy}{dx} = \frac{y^2}{x-1}$.

Find the particular solution $y = f(x)$ to the given differential equation with the initial condition $f(2) = 3$.

$$y = \frac{1}{\frac{1}{3} - \ln(x-1)}$$

ANS Note: This solution is valid for $1 < x < 1 + e^{1/3}$.

2016

4. Consider the differential equation $\frac{dy}{dx} = \frac{1}{3}x(y-2)^2$.

Find the particular solution $y = f(x)$ to the given differential equation with initial condition $f(1) = 0$.

ANS $y = 2 - \frac{6}{x^2 + 2}$

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