Calculus Name_____ ID: 1

Seperable Differential Equations

Date_____

Find the general solution of each differential equation.

1) $\frac{dy}{dx} = \frac{x^3}{y^2}$

2) $\frac{dy}{dx} = 2yx + yx^2$

3) $\frac{dy}{dx} = \frac{y}{x^2}$

4) $\frac{dy}{dx} = -\frac{1}{\sin y}$

5) $\frac{dy}{dx} = e^{x-y}$

6) $\frac{dy}{dx} = 4xy$

7) $\frac{dy}{dx} = \frac{3e^x}{y^2}$

8) $\frac{dy}{dx} = \frac{2x}{e^{2y}}$

9) $\frac{dy}{dx} = -\frac{2x}{y}$

10) $\frac{dy}{dx} = \frac{y-1}{x^2}$

For each problem, find the particular solution of the differential equation that satisfies the initial condition.

11) $\frac{dy}{dx} = 2e^{x-y},\ y(2) = \ln\left(2e^2 - 3\right)$

12) $\frac{dy}{dx} = x\sqrt{y},\ y(-1) = \frac{25}{16}$

13) $\frac{dy}{dx} = \frac{2x}{y^2},\ y(0) = -\sqrt[3]{2}$

14) $\frac{dy}{dx} = \frac{1}{\sec^2 y},\ y(1) = 0$

15) $\frac{dy}{dx} = y^2,\ y(2) = -\frac{1}{5}$

16) $\frac{dy}{dx} = xe^y,\ y(1) = -\ln\frac{3}{2}$

17) $\frac{dy}{dx} = 2xy^2,\ y(-3) = -\frac{1}{11}$

18) $\frac{dy}{dx} = 2e^{x-y},\ y(2) = \ln\left(2e^2 + 1\right)$

19) $\frac{dy}{dx} = \frac{2 + x^2}{y^2},\ y(-1) = -\sqrt[3]{7}$

20) $\frac{dy}{dx} = \sqrt{y},\ y > 0,\ y(-1) = \frac{1}{4}$

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Seperable Differential Equations

Date_____

Find the general solution of each differential equation.

1) $\frac{dy}{dx} = \frac{x^3}{y^2}$

$y = \sqrt[3]{\frac{3x^4}{4} + C}$

2) $\frac{dy}{dx} = 2yx + yx^2$

$y = Ce^{x^2 + \frac{x^3}{3}}$

3) $\frac{dy}{dx} = \frac{y}{x^2}$

$y = Ce^{-\frac{1}{x}}$

4) $\frac{dy}{dx} = -\frac{1}{\sin y}$

$y = \cos^{-1}(x + C)$

5) $\frac{dy}{dx} = e^{x-y}$

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

6) $\frac{dy}{dx} = 4xy$

$y = Ce^{2x^2}$

7) $\frac{dy}{dx} = \frac{3e^x}{y^2}$

$y = \sqrt[3]{9e^x + C}$

8) $\frac{dy}{dx} = \frac{2x}{e^{2y}}$

$y = \frac{\ln(2x^2 + C)}{2}$

9) $\frac{dy}{dx} = -\frac{2x}{y}$

$y = \sqrt{-2x^2 + C}$ or $y = -\sqrt{-2x^2 + C}$

10) $\frac{dy}{dx} = \frac{y-1}{x^2}$

$y = Ce^{-\frac{1}{x}} + 1$

For each problem, find the particular solution of the differential equation that satisfies the initial condition.

11) $\frac{dy}{dx} = 2e^{x-y}$, $y(2) = \ln\left(2e^2 - 3\right)$

$y = \ln\left(2e^x - 3\right), x > \ln\frac{3}{2}$

12) $\frac{dy}{dx} = x\sqrt{y}$, $y(-1) = \frac{25}{16}$

$y = \left(\frac{x^2}{4} + 1\right)^2$

13) $\frac{dy}{dx} = \frac{2x}{y^2}$, $y(0) = -\sqrt[3]{2}$

$y = \sqrt[3]{3x^2 - 2}, -\frac{\sqrt{6}}{3} < x < \frac{\sqrt{6}}{3}$

14) $\frac{dy}{dx} = \frac{1}{\sec^2 y}$, $y(1) = 0$

$y = \tan^{-1}(x - 1)$

15) $\frac{dy}{dx} = y^2$, $y(2) = -\frac{1}{5}$

$y = -\frac{1}{x + 3}, x > -3$

16) $\frac{dy}{dx} = xe^y$, $y(1) = -\ln\frac{3}{2}$

$y = -\ln\left(-\frac{x^2}{2} + 2\right), -2 < x < 2$

17) $\frac{dy}{dx} = 2xy^2$, $y(-3) = -\frac{1}{11}$

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

18) $\frac{dy}{dx} = 2e^{x-y}$, $y(2) = \ln\left(2e^2 + 1\right)$

$y = \ln\left(2e^x + 1\right)$

19) $\frac{dy}{dx} = \frac{2 + x^2}{y^2}$, $y(-1) = -\sqrt[3]{7}$

$y = \sqrt[3]{x^3 + 6x}, x < 0$

20) $\frac{dy}{dx} = \sqrt{y}$, $y > 0$, $y(-1) = \frac{1}{4}$

$y = \left(\frac{x}{2} + 1\right)^2, x > -2$