Calculus Practice: Differential Equations 3b

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

1) $y' = e^{x-y}$, $y(-2) = \ln \frac{3e^2 + 1}{e^2}$

2) $y' = \frac{2x^3}{y^2}$, $y(1) = \frac{\sqrt[3]{36}}{2}$

3) $y' = \frac{1}{\sec^2 y}$, $y(3) = 0$

4) $y' = \frac{2e^x}{y^2}$, $y(-1) = \frac{\sqrt[3]{3e^3 + 6e^2}}{e}$

5) $y' = x\sqrt{y}$, $y(-1) = \frac{25}{16}$

6) $y' = \frac{2xy}{x^2 + 2}$, $y(-1) = 3$

7) $y' = -y + 1$, $y(3) = \frac{e^3 + 1}{e^3}$

8) $y' = 2xy$, $y(1) = -e$

9) $y' = \frac{x}{y}$, $y(0) = -\sqrt{2}$

10) $y' = 4x^3y$, $y(1) = -e$

 Name________________

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

1) $y' = e^{x-y}$, $y(-2) = \ln \dfrac{3e^2+1}{e^2}$

$e^y = e^x + 3$
$y = \ln\left(e^x + 3\right)$

2) $y' = \dfrac{2x^3}{y^2}$, $y(1) = \dfrac{\sqrt[3]{36}}{2}$

$\dfrac{y^3}{3} = \dfrac{x^4}{2} + 1$
$y = \sqrt[3]{\dfrac{3x^4}{2} + 3}$

3) $y' = \dfrac{1}{\sec^2 y}$, $y(3) = 0$

$\tan y = x - 3$
$y = \tan^{-1}\left(x - 3\right)$

4) $y' = \dfrac{2e^x}{y^2}$, $y(-1) = \dfrac{\sqrt[3]{3e^3 + 6e^2}}{e}$

$\dfrac{y^3}{3} = 2e^x + 1$
$y = \sqrt[3]{6e^x + 3}$

5) $y' = x\sqrt{y},\ y(-1) = \frac{25}{16}$

$2\sqrt{y} = \frac{x^2}{2} + 2$

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

6) $y' = \frac{2xy}{x^2 + 2},\ y(-1) = 3$

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

$y = x^2 + 2$

7) $y' = -y + 1,\ y(3) = \frac{e^3 + 1}{e^3}$

$-\ln |-y + 1| = x$

$y = \frac{e^x + 1}{e^x}$

8) $y' = 2xy,\ y(1) = -e$

$\ln |y| = x^2$

$y = -e^{x^2}$

9) $y' = \frac{x}{y},\ y(0) = -\sqrt{2}$

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

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

10) $y' = 4x^3y,\ y(1) = -e$

$\ln |y| = x^4$

$y = -e^{x^4}$