Due:_______________

Name___________________________________

Determine if the function is a solution of the differential equation.

1) $x\dfrac{dy}{dx} - y = 0;\ \ y = Cx$

2) $\dfrac{dy}{dx} - \dfrac{x}{y} = 0;\ \ y = \sqrt{1 - x^2}$

Find the particular solution that satisfies the given condition.

3) $\dfrac{dy}{dx} = x - 6;$ curve passes through (2, 5)

4) $\frac{du}{dt} = u^3(t - 2t^3)$; $u = 3$ at $x = 0$

Solve the differential equation.

5) $y' + 2xy = 17x$

Solve the differential equation subject to the initial conditions.

6) $t\frac{dy}{dt} + 7y = t^3$; $t > 0$, $y = 1$ when $t = 2$

Solve the differential equation.

7) $2x \frac{dy}{dx} + y = 5x^4$

Solve the differential equation subject to the initial conditions.

8) $2\,\frac{dy}{dx} - 4xy = 8x$; $y = 18$ when $x = 0$

9) $x\frac{dy}{dx} + y = \cos x$; $x > 0$; $x = \pi$ when $y = 1$

Solve the problem.

10) First find a general solution of the differential equation $\frac{dy}{dx} = 3y^2$. Then find a particular solution that satisfies the initial condition $y(3) = -\frac{1}{9}$.

11) A tank contains 2000 L of a solution consisting of 50 kg of salt dissolved in water. Pure water is pumped into the tank at the rate of 10L/s, and the mixture (kept uniform by stirring) is pumped out at the same rate. How long will it be until only 5 kg of salt remain in the tank?

Solve the initial value problem.

12) $2\dfrac{dy}{dx} - 4xy = 8x;\ \ y(0) = 7$

Solve the differential equation.

13) $5y' = e^{x/5} + y$

14) $\cos x \dfrac{dy}{dx} + y \sin x = \sin x \cos x$

15) $\dfrac{dy}{dx} - \dfrac{y}{x} = (\ln x)^5$

Solve the problem.

16) $dy/dt = ky + f(t)$ is a population model where y is the population at time t and f(t) is some function to describe the net effect on the population. Assume $k = .02$ and $y = 10,000$ when $t = 0$. Solve the differential equation of y when $f(t) = 8t$.

17) $dy/dt = ky + f(t)$ is a population model where y is the population at time t and f(t) is some function to describe the net effect on the population. Assume $k = .02$ and $y = 10,000$ when $t = 0$. Solve the differential equation of y when $f(t) = -6t$.

1) Yes
Objective: (4.9) Verify Solution to Differential Equation

2) No
Objective: (4.9) Verify Solution to Differential Equation

3) $y = \frac{x^2}{2} - 6x + 15$

Objective: (4.9) Solve Initial Value Problem

4) $u = \frac{1}{\sqrt{t^4 - t^2 + \frac{1}{9}}}$

Objective: (4.9) Solve Initial Value Problem

5) $y = \frac{17}{2} + Ce^{-x^2}$

Objective: (7.7) Solve First-Order Linear Differential Equation I

6) $y = \frac{t^3}{10} + \frac{128}{5}t^{-7}$, $t > 0$

Objective: (7.7) Find Indicated Particular Solution

7) $y = \frac{5}{9}x^4 + \frac{c}{\sqrt{x}}$

Objective: (7.7) Solve First-Order Linear Differential Equation I

8) $y = -2 + 20e^{x^2}$
Objective: (7.7) Find Indicated Particular Solution

9) $y = \frac{\sin x + \pi}{x}$, $x > 0$

Objective: (7.7) Find Indicated Particular Solution

10) $y(x) = -\ \frac{1}{3(x + C)}$; $y(x) = -\frac{1}{3x}$

Objective: (Chapter9) Simple Equations and Models

11) approximately 518 seconds
Objective: (Chapter9) Linear Equations and Applications

12) $y = -2 + 9e^{x^2}$
Objective: (7.8) Solve Warm-Up Initial Value Problems

13) $y = \frac{xe^{x/5} + Ce^{x/5}}{5}$

Objective: (7.8) Solve Linear First-Order Differential Equation

14) $y = \cos x \ \ln|\sec x| + C\cos x$
Objective: (7.8) Solve Linear First-Order Differential Equation

15) $y = \frac{1}{6} x (\ln x)^6 + Cx$

Objective: (7.8) Solve Linear First-Order Differential Equation

16) $y = -400t - 20{,}000 + 30{,}000e^{.02t}$

Objective: (7.8) Solve Apps: First-Order Differential Equations

17) $y = 300t + 15{,}000 - 5000e^{.02t}$

Objective: (7.8) Solve Apps: First-Order Differential Equations