1. (1 point) Find the particular solution of the differential equation

$$\frac{dy}{dx}+4y=9$$

satisfying the initial condition $y(0)=0$.
Answer: $y=$ _____.
Your answer should be a function of x.
Answer(s) submitted:

•

(incorrect)

2. (1 point) Find the particular solution of the differential equation

$$\frac{dy}{dx}+y\cos(x)=7\cos(x)$$

satisfying the initial condition $y(0)=9$.
Answer: $y(x)=$ _____.
Answer(s) submitted:

•

(incorrect)

3. (1 point)
Solve the following initial value problem:

$$t\frac{dy}{dt}+6y=6t$$

with $y(1)=4$.

Find the integrating factor, $u(t)=$ _____,
and then find $y(t)=$ _____.
Answer(s) submitted:

•
•

(incorrect)

4. (1 point)
Solve the following initial value problem:

$$\frac{dy}{dt}+0.7ty=6t$$

with $y(0)=3$.
$y=$ _____.

Answer(s) submitted:

•

(incorrect)

5. (1 point)
Find the function $y(t)$ that satisfies the differential equation

$$\frac{dy}{dt}-2ty=15t^2e^{t^2}$$

and the condition $y(0)=-3$.
$y(t)=$ _____.
Answer(s) submitted:

•

(incorrect)

10. (1 point)
A Bernoulli differential equation is one of the form

$$\frac{dy}{dx}+P(x)y=Q(x)y^n.$$

Observe that, if $n=0$ or 1, the Bernoulli equation is linear. For other values of n, the substitution $u=y^{1-n}$ transforms the Bernoulli equation into the linear equation

$$\frac{du}{dx}+(1-n)P(x)u=(1-n)Q(x).$$

Use an appropriate substitution to solve the equation

$$y'-\frac{6}{x}y=\frac{y^4}{x^6},$$

and find the solution that satisfies $y(1)=1$.

$y(x)=$ _____.
Answer(s) submitted:

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(incorrect)

$u'e^{-4x}-4ue^{-4x}+4ue^{-4x}=9$

$u'e^{-4x}=9$

$u'=9e^{4x}$

$u=\frac{9}{4}e^{4x}+C$

1/ $\frac{dy}{dx} + 4y = 9$ $\boxed{y' + p(x)y = 9}$ want

$y(0) = 0$ $p(x) = 4$ non-homogeneous

complementary equation: $y' + 4y = 0$ ← homogeneous

$p(x) = 4$

$y' = -4y$: $\frac{y'}{y} = -4$ Integrate both side

wrt to y → wrt x

$\ln|y| = -4x$

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

$y = Ce^{-4x}$

$y' = -4Ce^{-4x}$

$\boxed{y = \left(\frac{9}{4}e^{4x} - \frac{9}{4}\right)e^{-4x}}$

$y' + 4y = 0$

$-4Ce^{-4x} + 4Ce^{-4x} = 0$

$y = u \cdot e^{-4x}$ → $y' = u' \cdot e^{-4x} - u \cdot 4e^{-4x}$ product rule

solution of the comp eq

$y = \left(\frac{9}{4}e^{4x} + C\right)e^{-4x}$: $0 = \left(\frac{9}{4} + C\right) \cdot 1$

---

1. (1 point) Find a function y of x such that

$$7yy' = x \text{ and } y(7) = 6.$$

$y =$ _____.

Answer(s) submitted:

-

(incorrect)

---

2. (1 point)
Solve the separable differential equation

$$\frac{dx}{dt} = \frac{5}{x},$$

and find the particular solution satisfying the initial condition

$$x(0) = 4.$$

$x(t) =$ _____.

Answer(s) submitted:

-

(incorrect)

---

3. (1 point)
Solve the separable differential equation

$$\frac{dy}{dx} = \frac{-0.8}{\cos(y)},$$

and find the particular solution satisfying the initial condition

$$y(0) = \frac{\pi}{6}.$$

$y(x) =$ _____.

Answer(s) submitted:

-

(incorrect)

---

4. (1 point)
Solve the separable differential equation

$$\frac{dx}{dt} = x^2 + \frac{1}{64},$$

and find the particular solution satisfying the initial condition

$$x(0) = 4.$$

$x(t) =$ _____.

Answer(s) submitted:

-

(incorrect)

---

5. (1 point)
Find the solution to the differential equation

$$\frac{dz}{dt} = 4te^{7z}$$

that passes through the origin.

$z =$ _____

Answer(s) submitted:

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(incorrect)

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6. (1 point)
Find the solution to the differential equation

$$\frac{dy}{dx} + \frac{y}{2} = 0,$$

subject to the initial conditions $y(0) = 10$.

$y =$ _____

Answer(s) submitted:

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(incorrect)

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$y(x) =$ _____.
Answer(s) submitted:

•

(incorrect)

10/ $u = y^{-3}$: $u' = \frac{du}{dx} = \frac{d}{dx}(y^{-3})$

$\Rightarrow u' = -3y^{-4}\cdot\frac{dy}{dx} = -\frac{3}{y^4}\cdot y'$

$= -3\cdot\frac{1}{y^4}\cdot y'$

$\frac{1}{y^4}\cdot y' - \frac{6}{x}\cdot y^{-3} = \frac{1}{x^6}$

$\frac{u'}{-3} - \frac{6}{x}\cdot u = \frac{1}{x^6}$ ($\frac{1}{x^6}$: non-homoge)

$*$ by -3

$$u' + \frac{18}{x}u = \frac{-3}{x^6}$$

Complementary: $u' + \frac{18}{x}u = 0$

$u = x^{-18}$

$\frac{u'}{u} = -\frac{18}{x}$

$\ln|u| = -18\ln|x|$

$= \ln(|x|^{-18})$

$u = vx^{-18} \rightarrow u' = v'x^{-18} - 18vx^{-19}$

$v'x^{-18} - 18vx^{-19} + \frac{18}{x}vx^{-18} = \frac{-3}{x^6}$

---

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