A function $y(t)$ is a solution of

$$\frac{dy}{dt} + t^k y = 0.$$

Suppose that $y(0) = 1$ and $y(1) = e^{-26}$.
Find the constant k and find $y(t)$.

$k =$ [ ]

Tries 0/3

$y(t) =$ [ ]

Tries 0/3

A bacterial culture grows at a rate proportional to its population. If the population is 5000 at $t = 0$ and 8000 at $t = 1$ hour, find the population as a function of time.

$y =$ [ ]

Tries 0/3

Find the function A given $A(0) = 7$ and A is less than 60 for all values of $t > 0$.

$$\frac{dA}{dt} = 3(60 - A)$$

$A(t) =$ [ ]

Tries 0/3

Consider the following initial value problem:

$$\frac{dy}{dx} = x^2 e^{-x^3}, \text{ **where** } y = 1 \text{ **when** } x = 2.$$

The value of the integration constant, C, in the solution of $y = f(x)$ is

[ ]

Tries 0/3

Find the particular solution of the equation.

$$\frac{dy}{dt} + y \sin t = 0, \quad y(\pi) = 10$$

$y =$ [ ]

Tries 0/3

Find the general solution of the differential equation:

$$\frac{dy}{dx} = 3x^2(6+y)$$

(Use C for the constant of integration.)
$y =$ [ ]
Tries 0/3

Find the particular solution of the differential equation

$$e^y \frac{dy}{dx} = e^{-3x},$$

such that $y = 6$ when $x = 0$.
$y =$ [ ]
Tries 0/3

Find the particular solution of the differential equation

$$\frac{dy}{dx} = \frac{3x+1}{4y^2}$$

such that $y = 6$ when $x = 0$.
$y =$ [ ]
Tries 0/3

Find the general solution of the equation.

$$\frac{dy}{dt} + 5y = 0$$

$y =$ [ ]
(Use C as an arbitrary constant).
Tries 0/3

A teen chewing bubble gum blows a huge bubble, the volume of which satisfies the differential equation:

$$\frac{dV}{dt} = 3\sqrt[3]{V^2}$$

Where t is the time in seconds after the teen start to blow the bubble. If the bubble pops as soon as it reaches 512 cubic centimeters in volume, how many seconds does it take for the bubble to pop? Assume that the bubble had no volume when the teen first started blowing.
Time to pop = [ ] Seconds

Tries 0/3

A wet towel hung on a clothesline to dry outside loses moisture at a rate proportional to its moisture content. After 1 hour, the towel has lost 31 % of its original moisture content. After how long will the towel have lost 79 % of its moisture content? (Round your answer to two decimal places.)
$t =$ [ ] hours

Tries 0/3

Find the general solution of the given differential equation

$$5x^2y' = y' + 6xe^{-y}.$$

$y =$ [ ]
(Use C as an arbitrary constant of integration).

Tries 0/3

Given the initial value problem

$$\frac{dy}{dx} = e^{4 \cdot lnx - y}, \;\; y(0) = 0,$$

y(4)= [ ]

Tries 0/3

A 700 -gallon tank initially contains 500 gallons of brine containing 75 pounds of dissolved salt. Brine containing 4 pounds of salt per gallon flows into the tank at the rate of 4 gallons per minute, and the well-stirred mixture flows out of the tank at the rate of 1 gallon per minute. Set up a differential equation for the amount of salt, $A(t)$, in the tank at time t.
(Use "A" for any "A(t)" needed in the equation)
$\frac{dA}{dt} =$ [ ]

Tries 0/3

Find what y(3) equals if y is a function of x which satisfies:

$$xy^2y' = 1 \;\; \textbf{and} \; y = 10 \;\; \textbf{when} \;\; x = 1.$$

y(3)= [ ]

Tries 0/3

Find the solution of the following differential equation:

$$\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{\cos(15x)}{e^{15y}}$$

such that y=1 when x=0.

y= [ ]

Tries 0/3

Find the general solution of the given differential equation.

$$\frac{dy}{dx} = \sqrt{8y}e^{x+6}$$

(Use C as an arbitrary constant)

$y =$ [ ]

Tries 0/3

In a particular chemical reaction, a substance is converted into a second substance at a rate proportional to the square of the amount of the first substance present at any time, t. Initially, 59 grams of the first substance was present, and 1 hour later only 12 grams of the first substance remained. What is the amount of the first substance remaining after 4 hours? (Round your answer to four decimal places.)

$m =$ [ ] grams

Tries 0/3

The rate of change in the number of miles of road cleared per hour by a snowplow with respect to the depth of the snow is inversely proportional to the depth of the snow. Given that 24 miles per hour are cleared when the depth of the snow is 2.3 inches and 11 miles per hour are cleared when the depth of the snow is 7 inches, then how many miles of road will be cleared each hour when the depth of the snow is 11 inches? (Round your answer to three decimal places.)

[ ] miles each hour

Tries 0/3

A 500-gallon tank initially contains 240 gallons of pure distilled water. Brine containing 5 pounds of salt per gallon flows into the tank at the rate of 4 gallons per minute, and the well stirred mixture flows out of the tank at the rate of 4 gallons per minute. Find the amount of salt in the tank after 7 minutes. (Round your answer to three decimal places.)

[ ] pounds

Tries 0/3

Find the general solution of the given differential equation.

$$\frac{dy}{dx} + \left(\frac{7}{x}\right)y = x - 6$$

$y =$ [ ]
(Use C for any needed constant).

Tries 0/3

If

$$y' + (\tan x)y = -15\cos x$$

for the interval $0 < x < \frac{\pi}{2}$, then
$y =$ [ ]
(Use C as an arbitrary constant)

Tries 0/3

Find the general solution of the given differential equation

$$y' - y = -19.$$

$y(x) =$ [ ]
(Use C for any needed constant).

Tries 0/3

Solve the initial value problem

$$t^2y' + ty = 5, \qquad y(1) = 3.$$

Find $y(4)$. Round your answer to 4 decimal places.
$y(4) =$ [ ]

Tries 0/3

Find the general solution of the equation.

$$\frac{dy}{dt} + ty = -19t$$

$y =$ [ ]
(Use C for any needed constant.)

Tries 0/3

Find the general solution of the equation

$$t\frac{dy}{dt} + 10y = \frac{1}{t}, \quad t > 0.$$

$y =$ [ ]
(Use C for any needed constant.)

Tries 0/3

Solve the initial-value problem

$$y' + \frac{1}{x}y = 9x^2$$
$$y(1) = -9.$$

$y =$ [ ]
Tries 0/3

Find the general solution of the equation

$$-3\frac{dy}{dt} + y = t.$$

$y =$ [ ]
(Use C for any needed constant.)
Tries 0/3

Find the general solution of the given differential equation

$$(y-208)\sin(x)dx - dy = 0.$$

(Use C for any needed constant.)
$y =$ [ ]
Tries 0/3

Pam owns an electronics store with storage capacity for 80 computer tablets. She currently has 55 computer tablets in inventory and determines that they are selling at a daily rate equal to 17% of the available capacity. When will Pam sell out of computer tablets? (Round your answer to the 3 decimal places).
[ ] days
Tries 0/3

Find the general solution of the equation.

$$5t\frac{dy}{dt} + y = \sqrt{t}, \quad t > 0.$$

$y =$ [ ]
(Use C for any needed constant.)

Tries 0/3

Find the integrating factor for the following differential equation

$$(\cos 8x)y' + 8(\tan 8x)y = 2\sec 8x, \qquad 0 < x < \frac{\pi}{16}.$$

Tries 0/3

In Purdue's Chemistry department, the chemists have found that in a water based solution containing 24 grams of certain undissolved chemicals, the rate of change of the amount of chemicals dissolved in the solution is proportional to the amount of the undissolved chemicals. Let $Q(t)$ (in grams) be the amount of dissolved chemicals at time t and let k be the *positive* proportionality constant. The differential equation describing the given situation is:
$dQ/dt =$
(Use Q instead of $Q(t)$)

Tries 0/3

There is a sudden growth of algae in a lake that kills other life in the water such that y tons of algae will be present after t weeks. The rate of growth of the algae is $y' = ty + t$ and the initial amount of algae is 7 tons. How long will it take the initial amount of algae to grow to 67 tons? (Round your answer to three decimal places.)
Amount of time = weeks

Tries 0/3

Find the general solution of the given differential equation

$$(x - 11)y' + y = x^2 + 8.$$

(Use C as an arbitrary constant.)
$y =$

Tries 0/3

A 500-gallon tank initially contains 200 gallons of brine containing 85 pounds of dissolved salt. Brine containing 3 pounds of salt per gallon flows into the tank at the rate of 4 gallons per minute, and the well-stirred mixture flows out of the tank at the rate of 1 gallon per minute. Set up a differential equation for the amount of salt $A(t)$ in the tank at time t. How much salt is in the tank when it is full? (Round your answer to the 2 decimal places).
pounds

Tries 0/3

A corporation starts to invest part of its revenue continuously at rate of P dollars per year in a fund for future expansion plans. Assume the fund earns money at an annual interest rate, r, compounded continuously. The rate of growth of the amount A in the fund is given by

$$\frac{dA}{dt} = rA + P.$$

Find A as a function of time for $P = 200$ and $r = 15\%$.
In your answer round all coefficients and constants to two decimal places as needed.
$A=$ [ ]

Tries 0/3

A 20300 cubic foot room initially has a radon level of 805 picocuries per cubic foot. A ventilation system is installed that brings in 560 cubic feet of air per hour that contains 6 picocuries per cubic foot, while an equal quantity of the well-mixed air in the room leaves the room each hour. Setup and use a differential equation to determine how long it will take for the room to reach a safe to breathe level of 112 picocuries per cubic foot. (Round your answer to 5 decimal places.)
$t =$ [ ] hours

Tries 0/3

Find the area bounded by the curves

$$y = \sqrt{x} \quad \text{and} \quad y = \sqrt{x+8}, \quad 0 \le x \le 14.$$

(Round your answer to 4 decimal places).

[ ]

Tries 0/3

Find the area bounded by the curves

$$y = x^2 - 2x \quad \text{and} \quad y = x - 2.$$

(Round your answer to 3 decimal places).

[ ]

Tries 0/3

The revenue, in **millions** of dollars, for a company in year t is given by the function:

$$R(t) = 15e^{0.08t}, \qquad 0 \le t \le 15$$

and the cost, in **millions** of dollars, to run the company in year t is approximated by:

$$C(t) = 12e^{-0.07t}, \qquad 0 \le t \le 15$$

where t is the number of years after January 1st of the year 2000. What was the net profit (in **millions** of dollars) for the company from January 1st in the year 2000 until January 1st in the year

2012? Round your answer to the nearest **million** dollars.
[ ] million dollars

Tries 0/3

Set up the integral and find the area of the region R bounded by

$$f(x) = \frac{24}{x} \quad \text{and} \quad g(x) = -49x + 98.$$

(Express the limits as real numbers.)

Area = $\int$ [ ] [ ] [ ]

Tries 0/3

(Round your answer to 4 decimal places.)
Area= [ ]

Tries 0/3

Find the area of region bounded by

$$y = x^3 + 16 \quad \text{and} \quad y = -5x^2 + 24x + 16 \quad \text{for} \quad x \geq 0.$$

(Round your answer to 3 decimal places).

[ ]

Tries 0/3

Find the area bounded by the curves

$$x = 7y - y^2 \quad \text{and} \quad x + y = 7.$$

(Round your answer to 3 decimal places).

[ ]

Tries 0/3

In 2010 the birthrate in a certain country increases from $16e^{0.04t}$ million births per year to $20e^{0.04t}$ million births per year, where t is the number of years since January 1, 2010.
Set up the integral and find the projected increase in population that would result due to the higher birth rate between January 1, 2010 and January 1, 2021.
(Express the limits as exact numbers.)

Area = $\int$ [ ] [ ] [ ]

Tries 0/3

(Round your answer to 3 decimal place.)
Increase in population= [ ] millions of births

Tries 0/3

A factory installs new machinery that will save $1250 - 34x$ dollars per year, where x is the number of years since installation. However, the cost of maintaining the new machinery is $99x$ dollars per year. Find the accumulated savings that will occur before the machinery should be replaced.
Sketching a graph is recommended to help determine when the replacement should occur.
(Round your answer to 3 decimal places.)
[ ] dollars

Tries 0/3

Find the area of the region R bounded by

$$y = \sin x, \quad y = \cos x, \quad x = -\frac{\pi}{10}, \quad x = 25/12.$$

(Round your answer to 4 decimal places).
[ ]

Tries 0/3

Find the equation of the horizontal line that divides the area of the region in half

$$y = 11 - x^2, \quad y = 0.$$

(Round your answer to 3 decimal places).
$y =$ [ ]

Tries 0/3

Find the volume of the solid that results by revolving the region enclosed by the curves

$$y = 4x, \quad x = 1, \quad x = 7, \quad \text{and} \quad y = 0$$

about the x-axis.
(Round your answer to 2 decimal places).
[ ]

Tries 0/3

Find the volume of the solid obtained by revolving the region bounded by $y = 2x - 2x^2$ and the x-axis around the x-axis.

(Use "pi" for π).

(If your answer involves "pi", enter your answer in the order expression*pi.)

Tries 0/3

Find the volume of the solid generated by revolving the region enclosed by the curves

$$y = 3\sec(x),\ y = 0,\ x = 0,\ \text{and } x = \frac{\pi}{8}$$

about the x-axis.
Accurately sketch a labeled graph of the region.
(Write the exact volume in terms of pi. Enter your answer in the order pi*expression.)

Tries 0/3

Find the volume of the solid generated by revolving the region bounded by

$$y = 6e^x,\ \ y = 0,\ \ x = 1,\quad \text{and}\ \ x = 8$$

about the x-axis.
(If your answer involves "pi", enter your answer in the order expression*pi.)

Volume = $\int$

Tries 0/3

(If your answer involves "pi", enter your answer in the order expression*pi.)
Volume = units^3

Tries 0/3

Find the volume of the solid generated by revolving the given region in the **1st quadrant** about the y-axis:

$$y = 8x^2,\quad x = 0,\quad y = 512.$$

NOTE: Use "pi" for π AND enter answer as (expression) * pi

Tries 0/3

Set up the integral and find the volume of the solid obtained by revolving the region bounded by $x + y = \frac{25}{8}$ and the x and y-axes around the x-axis.
(If your answer involves "pi", enter your answer in the order pi*expression.)

Volume = $\int$

Tries 0/3

(If your answer involves "pi", enter your answer in the order expression*pi.)
Volume = [ ] units^3

Tries 0/3

Find the volume of the solid that results by revolving the region enclosed by the curves

$$y = 2\sqrt{144 - x^2},\ y = 0,\ \text{and } x = 0$$

about the y-axis.
(If your answer involves "pi", enter your answer in the order expression*pi.)
Accurately sketch a labeled graph of the region.

Volume = $\int$ [ ] [ ] [ ]

Tries 0/3

(Write the exact volume in terms of pi.)
Volume = [ ] units^3

Tries 0/3

Find the volume of the solid generated by revolving the given region about the x-axis:

$$y = -x^2 + 8x + 18, \quad y = 18 - x$$

(If your answer involves "pi", enter your answer in the order pi*expression.) Volume = $\int$

Tries 0/3

(Round your answer to 1 decimal place.)
Volume = [ ] units^3

Tries 0/3

Find the volume of the solid generated by rotating $y = \sqrt{8x} + \sqrt{\dfrac{x}{8}}$ about the x-axis from $x = 6$ to $x = 8$.

(Round your answer to 3 decimal places).

[ ]

Tries 0/3

The shape of a fuel tank for the wing of a jet aircraft is designed by revolving the region bounded by the function $y = \frac{28}{17}x^2\sqrt{6-x}$ and the x-axis, where $0 \leq x \leq 6$, about the x-axis. Given x and y are in meters, find the volume of the fuel tank.

Volume = $\int$ ☐ ☐ ☐

Tries 0/3

(Round your answer to two decimal places.)
Volume = ☐ m^3

Tries 0/3

The equation

$$\frac{x^2}{4} + \frac{y^2}{64} = 1$$

describes an ellipse. Find the volume of the solid obtained by rotating the ellipse around the x-axis and also around the y-axis. These solids are called **ellipsoids**; one is vaguely rugby-ball shaped, one is sort of flying-saucer shaped, or perhaps squished-beach-ball-shaped.

(Round your answers to 3 decimal places).
(a) around the x-axis ☐

Tries 0/3

(b) around the y-axis ☐

Tries 0/3

Find the volume of the solid generated by revolving the given region about the y-axis:

$$y = \frac{2}{9}\ln x, \quad y = 0, \quad x = e^2.$$

(If your answer involves "pi", enter your answer in the order expression*pi.)

Volume = $\int$ ☐ ☐ ☐

Tries 0/3

(Round your answer to 3 decimal places).
Volume = ☐ $units^3$

Tries 0/3

Find the volume of the solid generated by revolving the region inside the circle $x^2 + y^2 = 16$ and to the right of the line $x = 3$ about the y-axis.

(Round your answer to 3 decimal places)

Tries 0/3

Find the volume of the solid generated by revolving the region enclosed by the curves

$$\frac{7}{4}y = e^{5x},\ x = 0,\ \text{and}\ y = 5e^{\frac{7}{4}}$$

about the x-axis.
Accurately sketch a labeled graph of the region.
(Round your answer to one decimal place.)

Tries 0/3

Find the volume of the solid that results by revolving the region enclosed by the curves

$$y = 5x,\ \ x = 1,\ \ x = 9,\quad \text{and}\ \ y = 0$$

about the y-axis.
(Round your answer to 3 decimal places).

Tries 0/3
