

3.8 Hmwk (Homework)

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Past Due **Due Date: SUN, APR 12, 2026 11:59 PM CDT**

Current Score: 20 / 20 POINTS | 100.0 %

Due date has passed. No changes can be made without an approved extension request.
You may not be granted an extension if you have already viewed the answer key.

 **VIEW ANSWER KEY**

Scoring and Assignment Information ^

QUESTION	1	2	3	4	5	6	7	8	9	10
POINTS	2 / 2	1.5 / 1.5	1 / 1	3 / 3	1 / 1	3 / 3	1 / 1	3.5 / 3.5	3 / 3	1 / 1

Assignment Submission

For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer.

Assignment Scoring

Your best submission for each question part is used for your score.

1. [2 / 2 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S CalcET9 3.8.008.

Strontium-90 has a half-life of 28 days.

- (a) A sample has initial mass of 50 mg. Find a formula for the mass remaining after t days, $y(t)$.

$y(t) =$

$50(1/2)^{(t/28)}$

✓ Perfect!

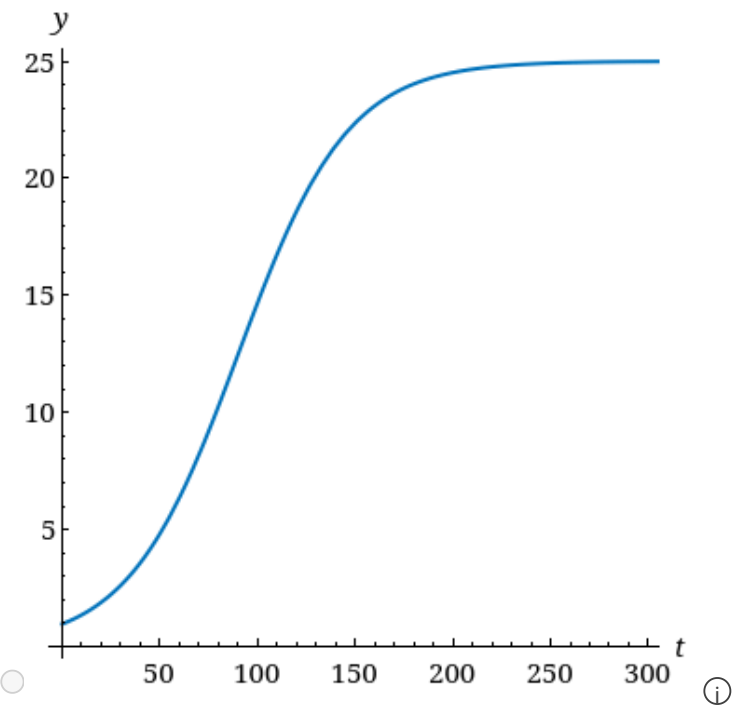
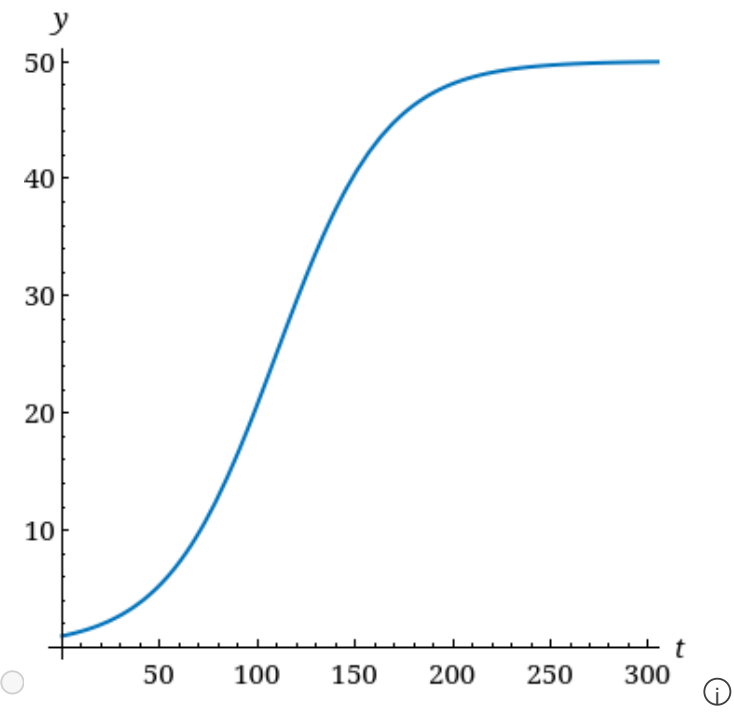
- (b) Find the mass (in mg) remaining after 20 days. (Round your answer to one decimal place.)

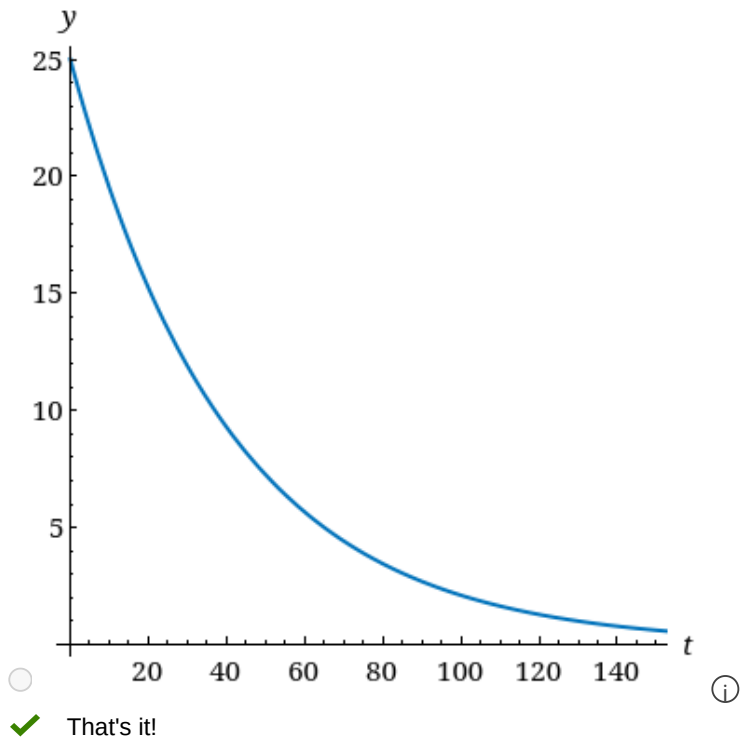
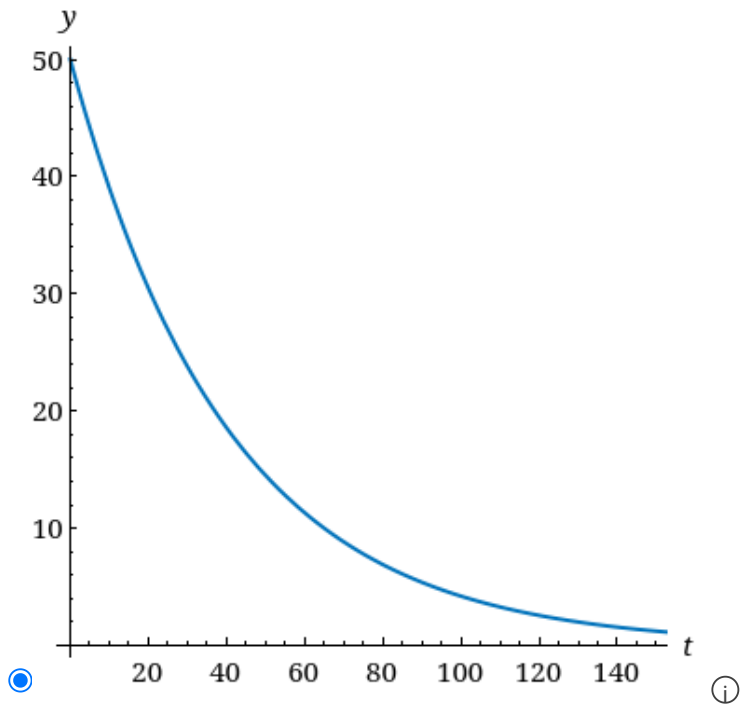
30.475 ✓ mg

- (c) How long does it take (in days) the sample to decay to a mass of 2 mg? (Round your answer to the nearest day.)

130.03 ✓ days

- (d) Sketch the graph of the mass function.





Resources

[Read It](#)

2. [1.5 / 1.5 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S CalcET9 3.8.009.MI.

The half-life of cesium-137 is 30 years. Suppose we have a 110 mg sample.

- (a) Find the mass (in mg) that remains after t years.

$$y(t) = 110(1/2)^{t/30}$$



mg

- (b) How much of the sample (in mg) remains after 80 years? (Round your answer to two decimal places.)

17.32 ✓ mg

- (c) After how many years will only 1 mg remain? (Round your answer to one decimal place.)

$t = 203.44$ ✓ yr

Resources

[Read It Watch It Tutorial](#)

3. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S CalcET9 3.8.016.

In a murder investigation, the temperature of the corpse was 32.2°C at 1:30 p.m. and 30.9°C an hour later. Normal body temperature is 37.0°C , and the ambient temperature was 20.0°C . How long ago (in minutes before 1:30 p.m.) did the murder take place? (Round your answer to the nearest minute.)

177 ✓ minutes before 1:30 p.m.

Resources

[Read It](#)

4. [3 / 3 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S CalcET9 3.8.010.EP.

Suppose a sample of a certain substance decayed to 77.4% of its original amount after 300 days.

Let $y(t) = Ae^{kt}$ be the mass remaining after t days. Find the exact value of k .

$k =$

$\ln(0.774)/300$

✔ Great job.

What is the half-life (in days) of this substance? (Round your answer to two decimal places.)

811.70 ✔ days

How long would it take the sample to decay to one-third of its original amount? (Round your answer to two decimal places.)

1286.51 ✔ days

Resources

[Read It](#)

5. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 3.8.015.MI.

A roast turkey is removed from an oven when its temperature has reached 185°F and is placed on a table in a room where the ambient temperature is 75°F . (Round your answers to the nearest whole number.)

- (a) If the temperature of the turkey is 150°F after half an hour, what is the temperature (in $^{\circ}\text{F}$) after 55 minutes?

$$T(55) = \boxed{130} \checkmark \text{ } ^{\circ}\text{F}$$

- (b) After how many minutes will the turkey have cooled to 105°F ?

$$t = \boxed{102} \checkmark \text{ min}$$

Resources

[Read It Watch It Tutorial](#)

6. [3 / 3 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

S_{Calc}ET9 3.8.004.

A bacteria culture grows with constant relative growth rate. The bacteria count was 2,560 after 4 hours and 2,621,440 after 12 hours.

- (a) What is the relative growth rate? Express your answer as a percentage. (Round your answer to two decimal places.)

✓ % per hr

- (b) What was the initial size of the culture?

✓ bacteria

- (c) Find an expression for the exact number of bacteria after t hours, $y(t)$.

$y(t) =$
 $80e^{5\ln(2)4t}$

✓ That's it!

- (d) Find the number of bacteria after 8.5 hours. (Round your answer to the nearest whole number.)

✓ bacteria

- (e) Find the rate of growth (in bacteria per hour) after 8.5 hours. (Round your answer to the nearest whole number.)

✓ bacteria per hour

- (f) How many hours did it take for the population to reach 96,000? (Round your answer to two decimal places.)

✓ hr

Resources

[Read It](#)

7. [1 / 1 Points]

DETAILS

MY NOTES

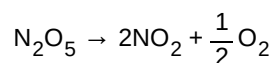
PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 3.8.007.

Suppose experiments show that if the chemical reaction



takes place at a certain temperature, the rate of reaction of dinitrogen pentoxide is proportional to its concentration as follows.

$$-\frac{d[\text{N}_2\text{O}_5]}{dt} = 0.0006[\text{N}_2\text{O}_5]$$

- (a) Find an expression for the concentration $[\text{N}_2\text{O}_5]$ after t seconds if the initial concentration is C .

$Ce^{-0.0006t}$

✓ Great!

- (b) How many seconds will the reaction take to reduce the concentration of N_2O_5 to 85% of its original value? (Round your answer to one decimal place.)

270.9 ✓ s

Resources[Read It](#)

8. [3.5 / 3.5 Points]

DETAILS

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PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 3.8.AE.002.

Example 2[Video Example](#) 

The half-life of radium-226 is 1,590 years.

- (a) A sample of radium-226 has a mass of 50 mg. Find a formula for the mass of the sample that remains after t years.
- (b) Find the mass after 500 years correct to the nearest milligram.
- (c) When will the mass be reduced to 20 mg?

Solution

- (a) Let $m(t)$ be the mass of radium-226 (in milligrams) that remains after t years. Then $dm/dt = km$ and $m(0) = 50$, so [this theorem](#) gives

$$m(t) = m(0)e^{kt} = \left(\boxed{50} \checkmark \right) e^{kt}.$$

In order to determine the value of k , we use the fact that $m(1,590) = \frac{1}{2} \left(\boxed{50} \checkmark \right)$. Thus

$$50e^{1590k} = \boxed{25} \checkmark \quad \text{so} \quad e^{1590k} = \boxed{1/2} \checkmark$$

and

$$1590k = \ln\left(\frac{1}{2}\right) = -\ln(2)$$

$$k = \frac{-\ln(2)}{1590}$$

$$k = \boxed{} \checkmark$$

Therefore

$$m(t) =$$

$$50e^{-\ln(2)t/1590}$$

$$\boxed{\phantom{50e^{-\ln(2)t/1590}}} \checkmark$$

We could use the fact that $e^{\ln(2)} = 2$ to write the expression for $m(t)$ in the alternative form

$$m(t) =$$

$$50 \cdot 2^{-t/1590}$$

$$\boxed{\phantom{50 \cdot 2^{-t/1590}}} \checkmark$$

(b) The mass after 500 years is as follows. (Round your final answer to the nearest milligram.)

$$m(500) = \frac{50 \cdot 2^{-500/1590}}$$

✓

$$\approx 40 \text{ mg}$$

(c) We want to find the value of t such that $m(t) = 20$, that is

$$50e^{-\ln(2)1590t}$$

✓ = 20 or

$$e^{-\ln(2)1590t}$$

✓ = 0.4.

We solve this equation for t by taking the natural logarithm of both sides.

$$e^{-\ln(2)1590t}$$

✓ = $\ln(0.4)$.

Thus, we have the following. (Round your final answer to the nearest year.)

$$t = \frac{-1590 \ln(0.4)}{\ln(2)}$$

✓

$$\approx 2102 \text{ yr}$$

Resources

[Read It](#)

9. [3 / 3 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 3.8.018.EP.

A freshly brewed cup of coffee has temperature 95°C in a 20°C room. When its temperature is 62°C , it is cooling at a rate of 1°C per minute.

Let $y = T - T_s$, where $T(t)$ is the temperature of the coffee in degrees Celsius at time t and T_s is the temperature of the surroundings in degrees Celsius. Find the values of A (in $^{\circ}\text{C}$) and k for $y(t) = Ae^{kt}$.

$$A = \boxed{75} \checkmark \text{ } ^{\circ}\text{C}$$

$$k = \boxed{-1/42} \checkmark \text{ Fantastic job!}$$

After how many minutes is the temperature of the coffee 62°C ? (Round your answer to two decimal places.)

$$\boxed{24.35} \checkmark \text{ min}$$

Resources

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10. [1 / 1 Points]

DETAILS

MY NOTES

PREVIOUS ANSWERS

ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 3.8.017.

When a cold drink is taken from a refrigerator, its temperature is 5°C . After 25 minutes in a 20°C room its temperature has increased to 10°C . (Round your answers to two decimal places.)

(a) What is the temperature of the drink (in $^{\circ}\text{C}$) after 55 minutes?

$$\boxed{13.85} \checkmark \text{ } ^{\circ}\text{C}$$

(b) After how many minutes will its temperature reach 13°C ?

$$\boxed{46.99} \checkmark \text{ min}$$

Resources

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