J.3 Hmwk - Vector Functions and Parametric Curves (Homework)

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Past Due **Due Date:** FRI, JAN 30, 2026 11:59 PM CST

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	3 / 3	2 / 2	3 / 3	1 / 1	2 / 2	3 / 3	3 / 3	1 / 1	1 / 1	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. **[3 / 3 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 13.1.011.

Sketch the curve with the given vector equation by finding the following points. (Select Update Graph to see your response plotted on the screen. Select the Submit button to grade your response.)

$$\mathbf{r}(t) = \langle t, 7 - t, 2t \rangle$$

$\mathbf{r}(-7)$ (x, y, z) = (

$$-7, 14, -14

✓)

$\mathbf{r}(0)$ (x, y, z) = (

$$0, 7, 0

✓)

$\mathbf{r}(7)$ (x, y, z) = (

$$7, 0, 14

✓)

Update Graph

Student Response

Response Description

Resources

Read It Watch It

2. **[2 / 2 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 13.1.023.

Find a vector equation and parametric equations for the line segment that joins P to Q.

$P(3.5, -1.2, 3.1)$, $Q(1.8, 0.3, 3.1)$

vector equation $\mathbf{r}(t) =$ $$\langle 3.5-1.7t,-1.2+1.5t, 3.1\rangle$

✔ Nicely done!

parametric equations $(x(t), y(t), z(t)) =$ ($$3.5-1.7t, -1.2+1.5t, 3.1

✔)

Resources

Read It Watch It

3. **[3 / 3 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER | PRACTICE ANOTHER

SCalcET9 13.1.AE.003.

Example

Video Example

Describe the curve defined by the vector function

$$\mathbf{r}(t) = \langle 3 + t, 2 + 2t, -4 + 5t \rangle.$$

Solution

The corresponding parametric equations are

$x =$ $$3+t$$ [ ] ✓ , $y = 2 + 2t$, $z =$ $$-4+5t$$ [ ] ✓ ,

which we recognize from the equations

$$x = x_0 + at, \quad y = y_0 + bt, \quad z = z_0 + ct$$

as parametric equations of a line passing through the point $(3, 2, -4)$ and parallel to the vector $\langle 1, 2, 5 \rangle$.

$\mathbf{v} =$ $$\langle 1, 2, 5 \rangle$$ [ ]

Alternatively, we could observe that the function can be written as $\mathbf{r} = \mathbf{r}_0 + t\mathbf{v}$, where $\mathbf{r}_0 = \langle 3, 2, -4 \rangle$ and ✓ , and this is the vector equation of a line as given by the equation $\mathbf{r} = \mathbf{r}_0 + t\mathbf{v}$.

Resources

Read It

4. **[1 / 1 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 13.1.057.

If two objects travel through space along two different curves, it is often important to know whether they will collide. (Will a missile hit its moving target? Will two aircraft collide?) Their paths might intersect, but we need to know whether the objects are in the same position *at the same time*.

Suppose the trajectories of two particles are given by the following vector functions.

$$\mathbf{r}_1(t) = \langle t^2, 15t - 54, t^2 \rangle, \quad \mathbf{r}_2(t) = \langle 14t - 48, t^2, 11t - 30 \rangle \quad \text{for } t \geq 0$$

Find the values of t at which the particles collide. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$t =$

$$6

Good!

Resources

Read It Watch It

5. **[2 / 2 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER | PRACTICE ANOTHER

SCalcET9 13.1.024.

Find a vector equation and parametric equations for the line segment that joins P to Q.

$P(a, b, c)$, $Q(u, v, w)$

vector equation $\mathbf{r}(t) =$ $$\langle a+t(u-a),\ b+t(v-b),\ c+t(w-c)\rangle$$

✔ Good job!

parametric equations $(x(t), y(t), z(t)) =$ ($$a+t(u-a),\ b+t(v-b),\ c+t(w-c)$$)

✔

Resources

Read It

6. **[3 / 3 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER | PRACTICE ANOTHER

SCalcET9 13.1.058.

If two objects travel through space along two different curves, it is often important to know whether they will collide. (Will a missile hit its moving target? Will two aircraft collide?) Their paths might intersect, but we need to know whether the objects are in the same position *at the same time*.

Suppose two particles travel along the following space curves.

$$\mathbf{r}_1(t) = \langle t, t^2, t^3 \rangle, \quad \mathbf{r}_2(t) = \langle 1 + 4t, 1 + 16t, 1 + 52t \rangle \quad \text{for } t \geq 0$$

Find the points at which their paths intersect. (If an answer does not exist, enter DNE.)

smaller x-value $(x, y, z) =$ ($$1, 1, 1 ✔)

larger x-value $(x, y, z) =$ ($$3, 9, 27 ✔)

Find the time(s) when the particles collide. (Enter your answers as a comma-separated list. If an answer does not exist, enter DNE.)

$t =$

$$DNE

✔ Nicely done.

Resources

Read It

7. **[3 / 3 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 13.1.013.

Sketch the curve with the given vector equation by finding the following points. (Select Update Graph to see your response plotted on the screen. Select the Submit button to grade your response.)

$$\mathbf{r}(t) = \langle 1, t, 4 - t^2 \rangle$$

$\mathbf{r}(-4)$ (x, y, z) = ($$1, −4, −12 ✓)

$\mathbf{r}(0)$ (x, y, z) = ($$1, 0, 4 ✓)

$\mathbf{r}(4)$ (x, y, z) = ($$1, 4, −12 ✓)

Update Graph | Student Response | Response Description

Resources

Read It

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8. **[1 / 1 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER

PRACTICE ANOTHER

SCalcET9 13.1.005.MI.

Find the limit.

$$\lim_{t \to \infty} \left\langle \frac{7 + t^2}{7 - t^2}, 7 \tan^{-1}(t), \frac{7 - e^{-2t}}{t} \right\rangle$$

$$⟨−1, 7π2, 0⟩

✔ Way to go!

Resources

Read It Tutorial

9. **[1 / 1 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER | PRACTICE ANOTHER

SCalcET9 13.1.002.

Find the domain of the vector function. (Enter your answer using interval notation.)

$$\mathbf{r}(t) = \cos(t)\,\mathbf{i} + \ln(t)\,\mathbf{j} + \frac{1}{t-5}\,\mathbf{k}$$

$$(0,5)\cup(5,\infty)$$

Awesome job!

Resources

Read It

10. **[1 / 1 Points]**

DETAILS | MY NOTES | PREVIOUS ANSWERS | ASK YOUR TEACHER | PRACTICE ANOTHER

SCalcET9 13.1.001.

Find the domain of the vector function. (Enter your answer using interval notation.)

$$\mathbf{r}(t) = \left\langle \ln(t+4),\ \frac{t}{\sqrt{36-t^2}},\ 2^t \right\rangle$$

$$(-4,6)$$

Well done.

Resources

Read It