LESSON 5

MA 26100-FALL 2023

DR. HOOD

LESSON 5 - WARM UP

Find the equation of the line through the points (1,2,3) and (5,7,9).

@t=1 $\vec{a} = \langle 5, 7, 9 \rangle$

(5,7,9)

Q

$\vec{PQ}$

P(1,2,3)

$\vec{PQ} = \langle 4, 5, 6 \rangle$

a) $\langle x, y, z \rangle = \langle 1, 2, 3 \rangle + t\langle 4, 5, 6 \rangle$

b) $\langle x, y, z \rangle = \langle 1, 2, 3 \rangle + t\langle 5, 7, 9 \rangle$

c) $\langle x, y, z \rangle = \langle 5, 7, 9 \rangle + t\langle 1, 2, 3 \rangle$

direction vector

MATH RESOURCE ROOM

- **TA's have office hours in the Math Resource Room (MRR)**
  - Room: WTHR 182
  - Opens Wednesday, Aug 30
  - Hours:
    - Monday – Thursday: 9:30am – 5:20pm
    - Friday: 9:30am – 1:20pm
  - Schedule is posted online:
    - https://www.math.purdue.edu/academic/courses/helproom

QUIZ 1 POLL

How did Quiz 1 go in recitation yesterday?

a) Good! ☺

b) Meh

c) Bad ☹

POLL 1

What is the domain of the vector-valued function

$$\vec{r}(t) = \left\langle e^{-4t}, t\ln(t), \sqrt{4-t^2} \right\rangle$$

a) (0, 2]

b) (-2, 2)

c) [0, 4]

d) [-4, 4]

$(0, 2]$

function	domain
e^{-4t}	$(-\infty, \infty)$
$t\ln(t)$	$(0, \infty)$
$\sqrt{4-t^2}$	$[-2, 2]$

POLL 2

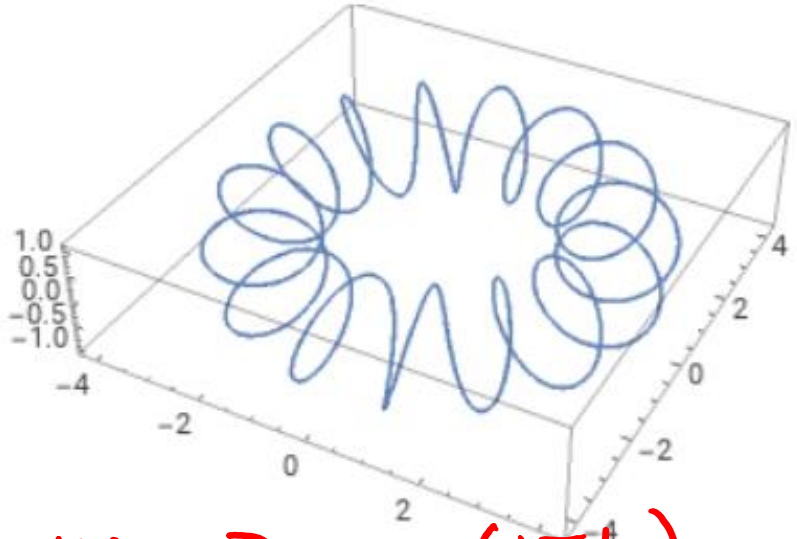
ellipse

Sketch the plot of $\vec{r}(t) = \langle \sin(t), 3\cos(t), t \rangle$

$z = t$ as $t \to \infty$, $z \to +\infty$

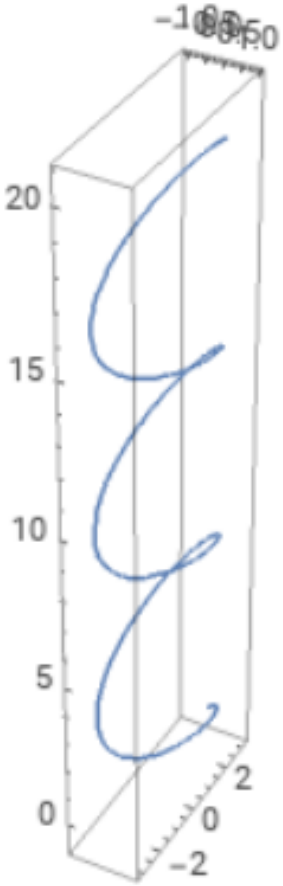
$\vec{r}(t) = \langle A(t)\cos(t), A(t)\sin(t), \sin(15t) \rangle$

a)



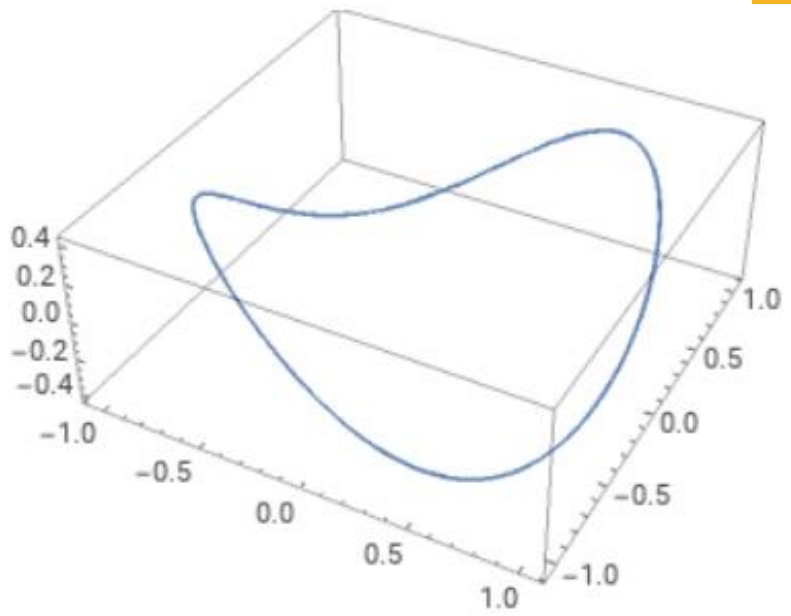
$A(t) = 3 + \cos(15t)$

b)



$\vec{r}(t) = \langle \sin(t), 3\cos(t), 0.4\sin(2t) \rangle$

c)



POLL 3

$\begin{cases} x+y+z=1 \\ x-2y+2z=4 \end{cases}$ solve

Given two planes $x + y + z = 1$ and $x - 2y + 2z = 4$, which vector-valued function describes the intersection of these two planes?

$x \quad y \quad z$

a) $\vec{r}(t) = \langle 2 + t, -1 - t, -2t \rangle$

b) $\vec{r}(t) = \langle 2 + 4t, -1 - t, -3t \rangle$

c) $\vec{r}(t) = \langle 2 + 4t, 2 - t, -3t \rangle$

a) $x + y + z = 1$

$(2+t) + (-1-t) + (-2t) = 1$

$1 - 2t = 1$

$t = 0$

b) $x + y + z = 1$

$(2+4t) + (-1-t) + (-3t) = 1$

$1 = 1$ ✓

Check $(2+4t) - 2(-1-t) + 2(-3t) = 4$ for all t

POLL 4

(Spring 22 Exam 1 #4)

Find a vector-valued function that represents the curve of the intersection of the cylinder $y^2 + z^2 = 1$ and the plane $x + 2y + z = 1$.

a) $\vec{\boldsymbol{r}}(t) = \langle 1 - 2\cos(t) - 2\sin(t), \cos(t), \sin(t) \rangle$

b) $\vec{\boldsymbol{r}}(t) = \langle 1 - 2\cos(t) - \sin(t), \cos(t), \sin(t) \rangle$

c) $\vec{\boldsymbol{r}}(t) = \langle 1 - \cos(t) - \sin(t), 2\cos(t), \sin(t) \rangle$

MUDDIEST POINT

What was the muddiest point from today's lecture?

a) Vector-Valued Functions
b) Domains of Vector-Valued Functions
c) Plotting Vector-Valued Functions
d) Finding Intersections
e) None – understood everything today