Find $\lim_{t \to 0} \left\langle e^{2t} + 8,\ t^2 + 5t - 6,\ \frac{7}{t} \right\rangle$.

- A. $\langle 16, -4, 7 \rangle$
- B. $\langle 8, -6, 7 \rangle$
- C. $\langle 8, 6, 0 \rangle$
- D. The limit does not exist.

$$\lim_{t \to 0} \frac{7}{t} = \text{DNE}$$

But

$$\lim_{t \to 0^+} \frac{7}{t} = \infty$$

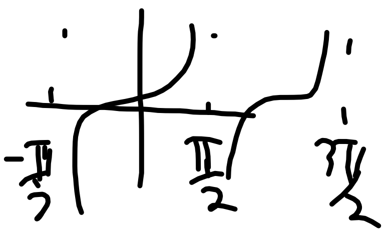
Determine for what values of t the vector–valued function $r(t) = \left\langle 7 \tan t, |t+4|, \frac{1}{t-5} \right\rangle$ is continuous.

- A. $r(t)$ is continuous except at $t = -5$ and $t = 2n\pi$, for $n = 0, \pm 1, \pm 2, \cdots$.
- B. $r(t)$ is continuous except at $t = 4$ and $t = 2n\pi$, for $n = 0, \pm 1, \pm 2, \cdots$.
- C. $r(t)$ is continuous except at $t = 4$ and $t = \frac{(2n+1)\pi}{2}$, for $n = 0, \pm 1, \pm 2, \cdots$.
- D. $r(t)$ is continuous except at $t = 5$ and $t = \frac{(2n+1)\pi}{2}$, for $n = 0, \pm 1, \pm 2, \cdots$.

Continuity
1. limit exist (2 sided) $\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x)$
2. $f(a)$ exist
3. $\lim_{x \to a} f(x) = f(a)$

$\tan x$ $\quad x \quad \frac{1}{x-5}$

$x \neq 5$



Find the derivative of $\mathbf{r}(t) = \langle \sin(t^8), e^{\cos t}, t \ln t \rangle$.

- A. $\langle 8t^7 \cos(t^8), \cos t\ e^{-\sin t}, \ln t + 1 \rangle$
- B. $\langle 8t^7 \cos(t^8), -\sin t\ e^{\cos t}, \ln t + 1 \rangle$
- C. $\langle 8t^7 \sin(t^8), -\sin t\ e^{\cos t}, \ln t + 1 \rangle$
- D. $\langle 8t^7 \sin(t^8), \cos t\ e^{-\sin t}, \ln t + 1 \rangle$

$\frac{d}{dt}\, t \cdot \ln t$

$t \cdot \frac{1}{t} + \ln t \cdot 1$

Product Rule

ine where the plane curve traced out by the vector–valued function

17 10

Determine where the plane curve traced out by the vector–valued function $\mathbf{r}(t) = \langle t^{17}, t^{10} \rangle$ is smooth.

Here, $\mathbf{r}'(t) = \langle 17t^{16}, 10t^{9} \rangle$ is continuous everywhere and $\mathbf{r}'(t) = \vec{0}$ if and only if $t = 0$. This says that the curve is smooth in any interval not including $t = 0$.

$\langle 0, 0 \rangle$

1 out of 3 attempts

Find the derivative of the vector–valued function.

$\mathbf{r}(t) = \langle \sin t, \cos 2t, \sin t^2 \rangle$

< , , >

$\langle \cos t, -2\sin(2t), \cos(t^2)\cdot 2t \rangle$

Sec. Ex. 31 - 11.2 Section Exercise 31

$t^{1/5}$

1 out of 3

Evaluate the given indefinite integral $\int \langle 5t^7 - 7, \sqrt[5]{t} \rangle \, dt$. Note that c represen any arbitrary constant vector.

$\langle \square, \square \rangle + \vec{c}$

$6/5$

$$\left\langle \frac{5t^8}{8} - 7t, \frac{5t^{6/5}}{6} \right\rangle$$

Evaluate $\int_0^1 \left\langle 9t^2 - 5, 12t \right\rangle \, dt$.

$\langle \square, \square \rangle$

$$\int_0^1 f(x)\,dx$$

$$\left\langle \frac{9t^3}{3} - 5t, \frac{12t^2}{2} \right\rangle \Big|_0^1$$

$$\langle 3-5, 6 \rangle$$

$$\langle -2, 6 \rangle$$

NetCal
Assistan
Check
View H
View C
Show M
Guided
Practic
Print
Questi
Report

Select the correct answer for t such that r(t) and r'(t) are perpendicular.
$r(t) = \langle 5 \cos t, 6 \sin t \rangle$

- A. $r(t) \perp r'(t)$ when $t = \frac{n\pi}{4}$ for any integer n.
- B. $r(t) \perp r'(t)$ when $t = n\pi$ for any odd integer n.
- C. $r(t) \perp r'(t)$ when $t = \frac{n\pi}{2}$ for any integer n.
- D. $r(t) \perp r'(t)$ when $t = \frac{n\pi}{2}$ for any even integer n.

$\vec{r} = \langle 5\cos t, 6\sin t \rangle$

$\vec{r}\,' = \langle -5\sin t, 6\cos t \rangle$

$-25 \sin t \cos t + 36 \cos t \sin t = 0$

$\cos t \sin t = 0$

1 out of 3 attempts

Select the correct answer for all values of t such that $\mathbf{r}'(t)$ is parallel to the xy–plane.

$\mathbf{r}(t) = \langle 2.8t^4, 2.9t^2, 4.304 \sin t^2 - 3.69 \rangle$

A. $\mathbf{r}'(t) \parallel xy$–plane when $t = 0$.

B. $\mathbf{r}'(t) \parallel xy$–plane when $t = 0$ or $\pm\sqrt{\frac{n\pi}{2}}$ for any integer n.

C. $\mathbf{r}'(t) \parallel xy$–plane when $t = 0$ or $\pm\sqrt{\frac{n\pi}{2}}$ for any odd integer n.

D. $\mathbf{r}'(t) \parallel xy$–plane when $t = 0$ or $\pm\sqrt{n\pi}$ for any integer n.

A

$$r' = \langle \dots, \dots, \underbrace{4.304\cos(t^2)\cdot(2t)}_{=0} \rangle$$

Supporting Work:

$\vec{r}(t) = \langle -50\cos t, 50\sin t, \frac{10t}{\pi} \rangle$

$\vec{v}(t) = \langle 50\sin t, 50\cos t, \frac{10}{\pi} \rangle$

$\vec{v}(0) = \langle 50\sin(0), 50\cos(0), \frac{10}{\pi} \rangle$

$\vec{v}(0) = \langle 0, 50, \frac{10}{\pi} \rangle$

Velocity is going up. for zero.

$\vec{v}(\pi) = \langle 50\sin(\pi), 50\cos(\pi), \frac{10}{\pi} \rangle$

$\vec{v}(\pi) = \langle 0, -50, \frac{10}{\pi} \rangle$ ft/min

The direction you would go at first is described by the vector $\langle 10, 0, \frac{10}{2\pi} \rangle$, at

Supporting Work:

$f(r) = \langle 10 \sin r, 10 \cos r, \frac{10r}{2\pi} \rangle$ 6 floors

~~Assuming~~

Let r = radius of orbit around building center

At top of building, $r = 12\pi$

$\therefore$

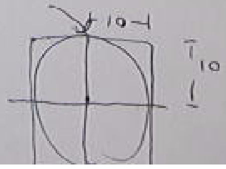
$f(12\pi) = \langle 0, 10, 60 \rangle$ → Hole Located Here

$f'(r) = \langle 10 \cos r, -10 \sin r, \frac{10}{2\pi} \rangle$

$f'(12\pi) = \langle 10, 0, \frac{10}{2\pi} \rangle \rightarrow \sqrt{10^2 + (\frac{10}{2\pi})^2} = 10.13$

10.13 m/sec

enter here

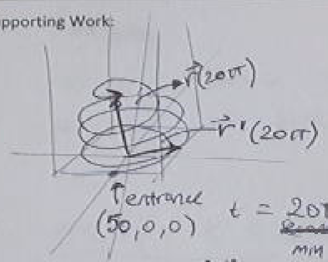


Conclusion (in words):

The velocity vector function at time $t = 20\pi$ ~~seconds~~ min is

$\vec{v}(t) = \vec{r}'(t) = \langle 0, 50, \frac{10}{2\pi} \rangle$. The velocity at time $t = 20\pi$ sec $= |\vec{r}'(t)| = \boxed{50.03 \text{ ft}/\cancel{\text{sec}}\ \text{min}}$

Supporting Work:



$\vec{r}(t) = \langle 50\cos t, 50\sin t, \frac{10t}{2\pi} \rangle$

$\vec{r}'(t) = \langle -50\sin t, 50\cos t, \frac{10}{2\pi} \rangle$

$\vec{r}(20\pi) = \langle 50, 0, 100 \rangle$

$\boxed{\vec{r}'(20\pi) = \langle 0, 50, \frac{10}{2\pi} \rangle}$

$t = 20\pi$ ~~seconds~~ min $= 62.8$ ~~seconds~~ minutes

@ $t = 20\pi$ ~~seconds~~ min, $\vec{v}(t) = \boxed{|\vec{r}'(20\pi)| = 50.03 \text{ ft}/\cancel{\text{sec}}\ \text{min}}$

Supporting Work:

$x = 1250\cos t$

$y = 1250\sin t$

$z = 100t$

$V = \langle 1250\cos t, 1250\sin t, 100t \rangle$

$V' = \langle -1250\sin t, 1250\cos t, 100 \rangle$

$t = \frac{\pi}{2}$:

$x = 1250 \cdot \cos\frac{\pi}{2} = 0$

$y = 1250 \cdot \sin\frac{\pi}{2} = 1250$

$z = 100 \cdot \frac{\pi}{2} = 50\pi$

$V'(0) = \langle -1250 \cdot \sin(0), 1250 \cdot \cos(0), 100 \rangle$

$\langle 0, 1250, 100 \rangle$

$S = \int \sqrt{(-1250\sin^2 t) + (1250\cos^2 t) + (100)^2}$

$V = S' = \sqrt{1250\sin^2 t + 1250\cos^2 t + 10000} \quad (t = \pi/2)$

$= \sqrt{8750}$ fts/min

≈ 93.54 fts/min

Supporting Work:

$t \to \text{sec}$ Watch your step

$x = 300\cos t$

$y = 300\sin t$

$z = \frac{10t}{2\pi}$

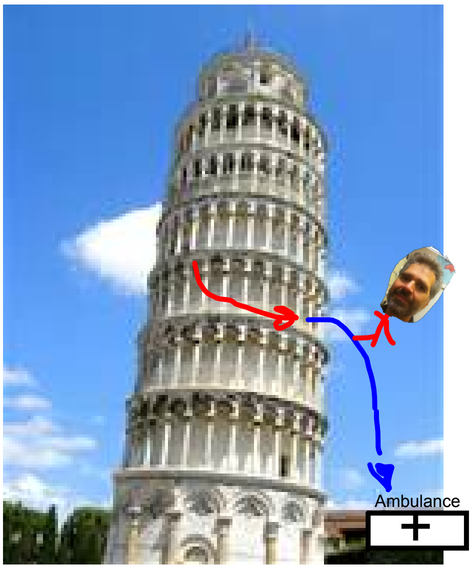
$\vec{r}(t) = \left(300\cos t,\ 300\sin t,\ \frac{10t}{2\pi}\right)$

$r'(t) = \left(-300\sin t,\ 300\cos t,\ \frac{10}{2\pi}\right)$

$t = 7\pi$ $\left(-300\sin(7\pi),\ 300\cos(7\pi),\ \frac{10}{2\pi}\right)$

vector $\rightarrow \left(0,\ -300,\ \frac{10}{2\pi}\right)$

$\sqrt{0^2 + 300^2 + \left(\frac{10}{2\pi}\right)^2} = 300$ ft/s


Ambulance
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