# 13.1 - Answer key

Jerin Thomas

6) Find limit of : $\lim_{t\to\infty} \langle \arctan t, e^{-2t}, \frac{\ln t}{t} \rangle$

$= \langle \frac{\pi}{2}, 0, \frac{\infty}{\infty} \rangle$

↓ use L'Hospital's Rule

$= \langle \frac{\pi}{2}, 0, \lim_{t\to\infty} (\frac{1}{t}) \rangle$

$= \boxed{\langle \frac{\pi}{2}, 0, 0 \rangle}$

16) $P(1,0,1)$ $Q(2,3,1)$

$\vec{r}(t) = (1-t)\, r_0 + t \cdot r_1$ → vector equation for a line segment

$= (1-t)\langle 1,0,1 \rangle + t\langle 2,3,1 \rangle$

$= \langle 1-t, 0, 1-t \rangle + \langle 2t, 3t, 1t \rangle$

$= \langle 1+t, 3t, 1 \rangle$

Parametric equations:

$\boxed{x = 1+t \quad y = 3t \quad z = 1}$

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24) $x = \cos t \quad y = \sin t \quad z = \ln t$

$x^2 + y^2 = 1 \rightarrow \cos^2 t + \sin^2 t = 1$

as $t \to 0$ [ $x \to 0, \; y \to 1, \; z \to -\infty$ ]

so the graph is a circular cylinder

[II]

34) The cylinder $x^2 + y^2 = 4$ and surface $z = xy$

$x = 2\cos t \quad y = 2\sin t \quad z = (2\cos t)(2\sin t)$

$= 4 \cos t \sin t$

$= 2 \sin(2t)$

parametric equations for the curve of intersection: $x = 2\cos t \quad y = 2\sin t \quad z = 2\sin(2t)$

$t : [0, 2\pi]$

Vector function: $\vec{r}(t) = \langle 2\cos t, \; 2\sin t, \; 2\sin(2t) \rangle$

or $\vec{r}(t) = 2\cos t \, i + 2\sin t \, j + 2\sin(2t) \, k$