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MATH 203: Calculus III

Second Periodic Exam

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Student Name:
Student ID:
Exam Duration: 1:15 Hour
Date: 22/06/1435 H

The First Question

Let $\mathbf{r(t)} = \langle \sqrt{2-t},\ \frac{e^t-1}{t},\ ln(t+1) \rangle$.

1. Find the domain of $\mathbf{r(t)}$.

2. Find $lim_{t \to 0}\mathbf{r(t)}$.

The Second Question

Reparametrise the curve $\mathbf{r(t)} = \langle e^{2t} \cos 2t,\ 2\ ,e^{2t} \sin 2t \rangle$ with respect to arc length measured from the point $(1, 2, 0)$ in the direction of increasing t.

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The Third Question

Find the equation of the binormal plane of the curve given by the parametric equations

$$x = 2\sin 3t \quad y = t \quad z = 2\cos 3t$$

at the point $(0, \pi, -2)$.

The Fourth Question

Find the curvature and the binormal vector of the space curve $\mathbf{r(t)} = \langle t, t^2, t^3 \rangle$ at the point $(0, 0, 0)$.

The Fifth Question

Let $\mathbf{r(t)} = \langle 3\sin t, \ 3\cos t \rangle, \ 0 \leqslant t \leqslant \frac{\pi}{2}$.

1. Find the velocity, acceleration and speed of the particle with the given position function $\mathbf{r(t)}$.

2. Sketch the path of the particle and draw the velocity and acceleration vectors for $t = 0$.

The Sixth Question

Classify the quadric surface $4y^2 + z^2 - x - 16y - 4z + 20 = 0$ and identify its traces.

GOOD LUCK!