Question 1

Calculate the cross product of \( \mathbf{r}_1 = (2, -1, 1) \) and \( \mathbf{r}_2 = (3, 1, -2) \).

Answer: 

Question 2

Let \( \mathbf{r}(t) = (3t^{1/3}, e^{t^2-1}, 2t) \). Find \( \mathbf{T}(1) \).

Answer: 

Question 3

Let $\mathbf{r}(t) = (t^3, t - 1, t^2)$. Find normal plane at point $t = 1$.

Answer: ..................

Question 4

Let $\mathbf{r}(t) = (\cos(t), t, t^2)$. Find curvature $\kappa$ at point $t = 0$.

Answer: ..................
Question 5

Find the area of the parallelogram generated by the vectors $(1, 2, -1)$ and $(-1, 1, 2)$.

Answer: ..................

Question 6

Find the equation of the plane containing the points $(1, 2, 3)$, $(1, 1, -1)$ and $(-1, 2, 1)$.

Answer: ..................
Question 7

A particle moves with position function \( \mathbf{r}(t) = (t, \sin(t), e^{-t}) \). Find velocity, acceleration and tangential and normal components of acceleration at point \( t = 0 \).

Answer: .................
Question 8

Let \( f(x, y) = e^{x^2y} + y^2 \ln(x) \). Find partial derivatives \( f'_x \) and \( f'_y \).

Answer: ..................

Question 9

Let \( f(x, y) = x \cos(y) - x^2 y^3 \). Find all second partial derivatives: \( f''_{xx}, f''_{xy}, f''_{yy} \).

Answer: ..................
Question 10

Let $f = xyz$ and $\mathbf{F} = (xyz, y, z^2y)$. Find $\nabla f$, $\text{div} \mathbf{F}$ and $\text{curl} \mathbf{F}$.

Answer: .................