

Math 2551 A1-3 Midterm 1

Section:

Name:

Student ID:

(1) Find the parametric equation for the line that is tangent to the curve $\mathbf{r}(t) = t^2\mathbf{i} + (2t - 1)\mathbf{j} + t^3\mathbf{k}$ at the given parameter value $t = 2$.

(2) Solve the following initial value problem for \mathbf{r} as a vector function of t .

Differential equation: $\frac{d\mathbf{r}}{dt} = (t^3 + 4t)\mathbf{i} + t\mathbf{j} + 2t^2\mathbf{k}$

Initial condition: $\mathbf{r}(0) = \mathbf{i} + \mathbf{j}$

(3) Find the length of the indicated portion of the curve $\mathbf{r}(t) = (6 \sin (2t))\mathbf{i} + (6 \cos (2t))\mathbf{j} + 5t\mathbf{k}$, $0 \leq t \leq \pi$.

(4) Find \mathbf{T} , \mathbf{N} and k for the space curve $\mathbf{r}(t) = (6 \sin (2t))\mathbf{i} + (6 \cos (2t))\mathbf{j} + 5t\mathbf{k}$. Then find the equation for the osculating plane at $t = 0$.