

All necessary work must be shown. Your work must represent the question asked. Your work must be neat or I will not grade your work. You may discuss this assignment with others, but all work turned in must be your own work. Turn in this sheet with your work. For each of the curves below give the $\{\bar{T}, \bar{N}, \bar{B}\}$ coordinate system.

1. $x = 2t^3 - 3t^2; y = t^2 - 2t$. Also, graph this curve and give \bar{r}' at all the places where $x' = 0$ or $y' = 0$.

2. $\bar{r}(t) = \sin(2t)\bar{i} + \sin(4t)\bar{j}$. Also, graph this curve and give $\frac{ds}{dt}$ at all the places where $x' = 0$ or $y' = 0$.

3. $\bar{r}'(t) = \langle t \cos(t), t \sin(t), \sqrt{1-t^2} \rangle$. Also, give the equation of the tangent line and the normal plane to the tangent line at $t = \frac{1}{2}$ given that $\bar{r}(0) = (0, 0, 0)$.