Please show **all** your work! Answers without supporting work will not be given credit.
Clearly mention what theorem(s), if any, you are using.
Write answers in spaces provided.
You have 15 minutes to complete this Quiz.
You can get MAXIMUM $(9+6=)15$ marks.

Name:

1. Find the rate of change of $f(x,y,z) = x^3 + xyz + zy^2$ with respect to t along the curve

   $$\vec{r}(t) = e^{-t}\hat{i} + \sin t\,\hat{j} + \cos(\ln t)\hat{k}$$

   when $t = 1$.

2. Find the point(s) on the surface $xy + yz + zx + 4 = 0$ where the tangent plane is parallel to the $YZ-$plane.

   [HINT: If the tangent plane is parallel to the $YZ-$plane, what can you say about the $\hat{j}$ and $\hat{k}$ components of the gradient vector i.e. the Normal?]