

**MATH 231: Calculus of Several Variables**  
**Section 1, 107 Ag Sc & Ind Bldg,**  
**TR 9:05 AM - 9:55 AM**

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**Homework 13:** Due Thursday, Oct 24

1. Find the (i) unit tangent, (ii) normal, and (iii) binormal vectors for the following functions.

(a)  $\vec{r}(t) = (1 + t^2)\vec{i} + (t^3)\vec{j}$

(b)  $\vec{r}(t) = \cos(t)\vec{i} + \sin(t)\vec{j} + t\vec{k}$

2. Find  $a_T$  for the following functions.

(a)  $\vec{r}(t) = (1 + t)\vec{i} + (t^2 - 2t)\vec{j}$

(b)  $\vec{r}(t) = \cos(t)\vec{i} + \sin(t)\vec{j} + t\vec{k}$