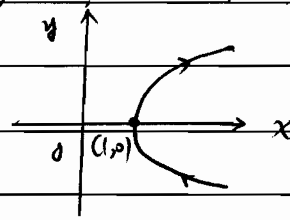
Grade $\begin{cases} 14.1 : 5,\ 14 \\ 14.2 : 15,\ 20,\ 24,\ 35,\ 40 \\ 14.3 : 4,\ 9,\ 12 \end{cases}$

HW#3.

14.1 #5. $\langle 2, \frac{1}{2}, \tan 1 \rangle$

#7.

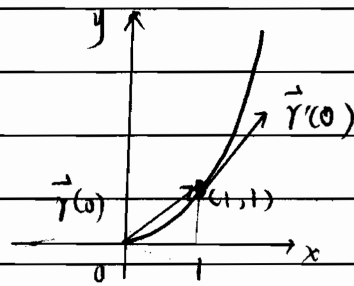


#14 The curve is the circle of Radius $\sqrt{2}$, center $(0,0,0)$ in the plane $x=y$

#19-24: $19 \to \mathrm{VI}$, $20 \to \mathrm{II}$, $21 \to \mathrm{IV}$, $22 \to \mathrm{I}$, $23 \to \mathrm{V}$, $24 \to \mathrm{III}$,

#26: $\left.\begin{array}{l} x^2 = \sin^2 t = y \\ x^2+y^2 = \sin^2 t + \cos^2 t = 1 \end{array}\right\}$ So the curve is the intersection of the parabolic cylinder and the circular cylinder

14.2 #7



$\vec{r}\,'(t) = e^t \vec{i} + 3e^{3t} \vec{j}$.

#15. $\vec{r}(t) = \vec{b} + 2t\vec{c}$

#20. $\vec{T}(\frac{\pi}{4}) = \frac{1}{2}\vec{i} - \frac{1}{2}\vec{j} + \frac{1}{\sqrt{2}}\vec{k}$

#21 $\vec{r}\,'(t) = \langle 1, 2t, 3t^2 \rangle$

$\vec{r}\,'(1) = \langle 1, 2, 3 \rangle$

$|\vec{r}\,'(1)| = \sqrt{14} \Rightarrow \vec{T}(1) = \langle \frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}} \rangle$

$\vec{r}\,''(t) = \langle 0, 2, 6t \rangle$

$\vec{r}\,'(t) \times \vec{r}\,''(t) = \langle 6t^2, -6t, 2 \rangle$

#24. $\begin{cases} x = -1 \\ y = 1 \\ z = 1+t \end{cases}$

#35. $\vec{i} + \vec{j} + \vec{k}$

#40. $\vec{r}(t) = (2-\cos t)\vec{i} + (1-\sin t)\vec{j} + (2+t^2)\vec{k}$.

14.3 #4 $L = e^2$

#9. $\vec{r}(t(s)) = \frac{2}{\sqrt{29}} s\,\vec{i} + \left(1 - \frac{3}{\sqrt{29}} s\right)\vec{j} + \left(5 + \frac{4}{\sqrt{29}} s\right)\vec{k}$

#10. $\vec{r}(t(s)) = \left(\frac{s}{\sqrt{2}}+1\right)\cos\left(\ln\left(\frac{s}{\sqrt{2}}+1\right)\right)\vec{i} + 2\vec{j} + \left(\frac{s}{\sqrt{2}}+1\right)\sin\left(\ln\left(\frac{s}{\sqrt{2}}+1\right)\right)\vec{k}$

#12 $\vec{r}(t(s)) = \cos s\,\vec{i} + \sin s\,\vec{j}$

#15. $\vec{T}(t) = \frac{1}{e^{2t}+1} \langle \sqrt{2}e^t, e^{2t}, -1 \rangle$

$\vec{N}(t) = \frac{1}{e^{2t}+1} \langle 1 - e^{2t}, \sqrt{2}e^t, \sqrt{2}e^t \rangle$

$\kappa(t) = \frac{\sqrt{2}e^{2t}}{(e^{2t}+1)^2}$

#21 $\kappa(1) = \frac{\sqrt{76}}{(\sqrt{14})^3} = \frac{1}{7}\sqrt{\frac{19}{14}}$