Parcial I

① $\vec{r}(t) = \langle 2t+5,\ t^2+t \rangle \Rightarrow \vec{r}'(t) = \langle 2, 2t+1 \rangle$

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

Luego, La recta tiene ecuación

$\vec{p}(t) = \langle 7, 2 \rangle + t\langle 2, 3 \rangle = \langle 7+2t,\ 2+3t \rangle$.

② $\vec{r}(t) = \langle 1,\ t\sin t + \cos t,\ t\cos t - \sin t \rangle$

a) $\vec{r}'(t) = \langle 0,\ \sin t + t\cos t - \sin t,\ \cos t - t\sin t - \cos t \rangle$

$= \langle t\cos t,\ -t\sin t \rangle$

$\Rightarrow \|\vec{r}'(t)\| = \sqrt{t^2\cos^2 t + t^2 \sin^2 t} = \sqrt{t^2(\cos^2 t + \sin^2 t)}$

$= \sqrt{t^2} = t.$

$\Rightarrow s = \int_0^{\pi} t\,dt = \frac{t^2}{2}\Big|_0^{\pi} = \frac{\pi^2}{2}$.

b) $K = \frac{\|\vec{T}'\|}{\|\vec{r}'\|}$

$\vec{T} = \frac{\vec{r}'}{\|\vec{r}'\|} = \langle 0, \cos t, -\sin t \rangle$

$\vec{T}' = \langle 0, -\sin t, -\cos t \rangle$

$\|\vec{T}'\| = 1$

$= \frac{1}{\|\vec{r}'(t)\|} = \frac{1}{t}$

$\Rightarrow \boxed{K(\pi) = \frac{1}{\pi}}$

③ $\vec{r}(t) = \langle t^2, 3t^2, t^2+t \rangle \Rightarrow \vec{r}(1) = \langle 1, 3, 2 \rangle$

$\vec{v} = \vec{r}'(t) = \langle 2t, 6t, 2t+1 \rangle \Rightarrow \vec{v}(1) = \langle 2, 6, 3 \rangle$

$\vec{a} = \vec{r}''(t) = \langle 2, 6, 2 \rangle \Rightarrow \vec{a}(1) = \langle 2, 6, 2 \rangle$