and, since $\chi(\Sigma) = 24$, this yields

$$\#R = \frac{1}{2}(24+8) = 16.$$

$\ulcorner$ By the computation on P593, $\chi(\Sigma) = 24$.
$S \subset \mathbb{P}^3$, ℓ line in $\mathbb{P}^3$ $\Rightarrow$ By the arguments on P167, $\#(S\cdot\ell) = \#(S^*\cdot\ell^*) = 4$. Each element $p^* \in S^* \cap \ell^*$ represents a tangent plane of S and ℓ^* is a pencil of form $\{H_\lambda \cap S\}$ $\Rightarrow$ $\nu = \#(S^*\cdot\ell^*) = 4$.
$\Rightarrow$ $2\#R + 4 - 12 = 24$ $\Rightarrow$ $2\#R = 24 + 8 = 32$
$\Rightarrow$ $\#R = 16$ $\lrcorner$

Another way to compute the number of double points of S is by Schubert calculus, inasmuch as $\#R$ will be just the number of points of intersection of the three- and six-dimensional cycles

$$\tau = \{\sigma(p)\}_{p\in\mathbb{P}^3}$$

and

$$\omega_F = \{\Lambda_2 \subset \mathbb{P}^5 : \Lambda_2 \cdot F \text{ is a double line}\}$$

in the Grassmannian $G(3,6)$ of 2-planes in $\mathbb{P}^5$.

$\ulcorner$ $\omega_F \cap \tau \longleftrightarrow R$
$\sigma(p) \longleftrightarrow p$ s.t $\sigma(p)\cdot F$ is a double line