$\mathbf{r}_1(t) = \langle 4 + 3t, 1 - t^2, 4 - 5t + t^2 \rangle \quad \Rightarrow \quad \mathbf{r}_1'(t) = \langle 3, -2t, -5 + 2t \rangle$, $\mathbf{r}_2(u) = \langle 3 + u^2, 2u^3 - 1, 2u + 2 \rangle \quad \Rightarrow \quad \mathbf{r}_2'(u) = \langle 2u, 6u^2, 2 \rangle$. Both curves pass through P since $\mathbf{r}_1(0) = \mathbf{r}_2(1) = \langle 4, 1, 4 \rangle$, so the tangent vectors $\mathbf{r}_1'(0) = \langle 3, 0, -5 \rangle$ and $\mathbf{r}_2'(1) = \langle 2, 6, 2 \rangle$ are both parallel to the tangent plane to S at P. A normal vector for the tangent plane is $\mathbf{r}_1'(0) \times \mathbf{r}_2'(1) = \langle 3, 0, -5 \rangle \times \langle 2, 6, 2 \rangle = \langle 30, -16, 18 \rangle$, so an equation of the tangent plane is $30(x - 4) + -16(y - 1) + 18(z - 4) = 0$ or $15x + -8y + 9z = 88$.