(a) $\vec{r}_1(t) = \vec{r}_2(t) \implies t^2 = 5t - 6$

$$2t + 3 = t^2$$

$$t^2 = 9$$

Only $t = 3$ satisfies all three equations.

At $t = 3$ the point on $\vec{r}_1(t)$ and $\vec{r}_2(t)$ is $\langle 9, 9, 9 \rangle$.

(b) The angle θ between their paths is the angle between the tangent vectors at $t = 3$.

$\vec{r}_1'(t) = \langle 2t, 2, 2t \rangle \implies \vec{r}_1'(3) = \langle 6, 2, 6 \rangle$

$\vec{r}_2'(t) = \langle 5, 2t, 0 \rangle \implies \vec{r}_2'(3) = \langle 5, 6, 0 \rangle$

$$\cos \theta = \frac{\langle 6, 2, 6 \rangle \cdot \langle 5, 6, 0 \rangle}{\sqrt{6^2 + 2^2 + 6^2} \sqrt{5^2 + 6^2 + 0^2}} = \frac{42}{\sqrt{76}\sqrt{61}}$$