Time Derivatives of holonomic constraint $\Rightarrow \dot{b}$

$\#2 \Rightarrow -$

$\#\dot{3} \Rightarrow \dot{a}\cos\theta_1\cos\theta_2 - (a+r)\dot{\theta}_1\sin\theta_1\cos\theta_2 - (a+r)\dot{\theta}_2\cos\theta_1\sin\theta_2$

$\#\dot{4} \Rightarrow \dot{a}\sin\theta_1\sin\theta_2 + (a+r)\dot{\theta}_1\cos\theta_1\sin\theta_2 + (a+r)\dot{\theta}_2\sin\theta_1\cos\theta_2$

$\dot{I} \Rightarrow 2\dot{\theta}_2 l^2 \sin\theta_2\cos\theta_2$

$\dot{II} \Rightarrow -2\dot{a}(a+r)\cos\theta_1^2\sin\theta_2^2$
$+2\dot{\theta}_1(a+r)^2\cos\theta_1\sin\theta_1\sin\theta_2^2$
$-2\dot{\theta}_2(a+r)^2\cos\theta_1^2\sin\theta_2\cos\theta_2$

$\dot{V} \Rightarrow 4\dot{a}(a+r)\cos\theta_1\cos\theta_2\sin\theta_1\sin\theta_2$
$-2(a+r)^2\dot{\theta}_1\sin\theta_1^2\cos\theta_2\sin\theta_2$
$-2(\dot{a}+r)^2\cos\theta_1\dot{\theta}_2\sin\theta_2^2\sin\theta_1$
$+2(a+r)^2\cos\theta_1\dot{\theta}_1\cos\theta_1^2\sin\theta_2$
$+2(a+r)^2\cos\theta_1\sin\theta_1\dot{\theta}_2\cos\theta_2^2$

$\dot{IV} \Rightarrow -2\dot{a}\cos\theta_2^2\sin\theta_1^2$
$2\dot{\theta}_2(a+r)\cos\theta_2\sin\theta_2\sin\theta_1^2$
$-2\dot{\theta}_1(a+r)\cos\theta_2^2\sin\theta_1\cos\theta_1$

$\dot{III} \Rightarrow -2\dot{a}(a+r)\cos\theta_2^2\sin\theta_1^2$
$+2(a+r)^2\dot{\theta}_2\cos\theta_2\sin\theta_2\sin\theta_1^2$
$-2(a+r)^2\cos\theta_2^2\dot{\theta}_1\sin\theta_1\cos\theta_1$

$l\sin\theta_2$

$\frac{d}{dt}(l\sin\theta_2) = l\dot{\theta}_2\cos\theta_2$