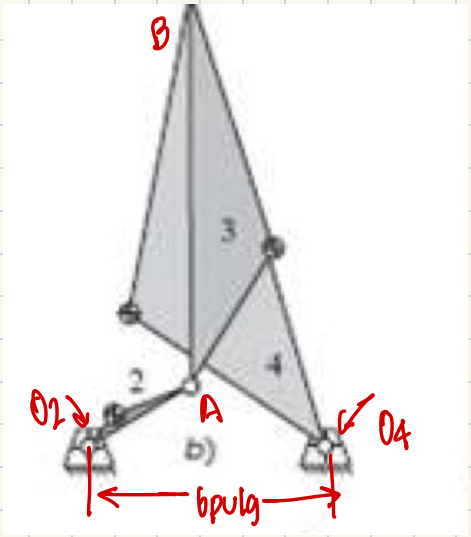
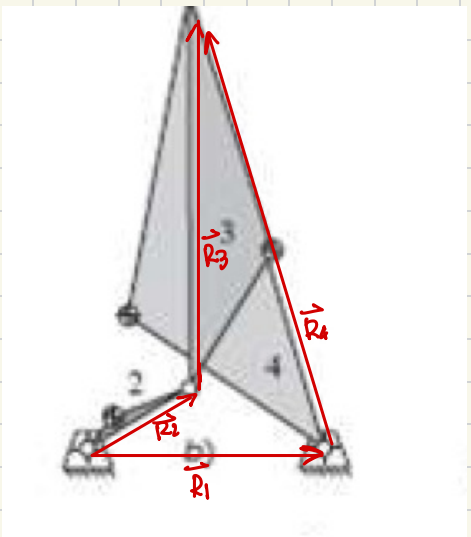
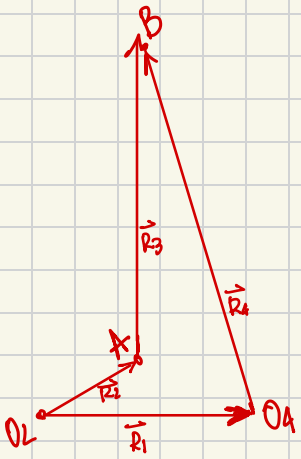
Parte 1	Longitudes en pulgadas, ángulos en grados, aceleración angular en rad/s²						
Fila	eslabón 2	eslabón 3	eslabón 4	eslabón 1	θ_2	θ_3	θ_4
a.	4	12	8	15	45	24.97	99.30
b.	3	10	12	6	30	90.15	106.60

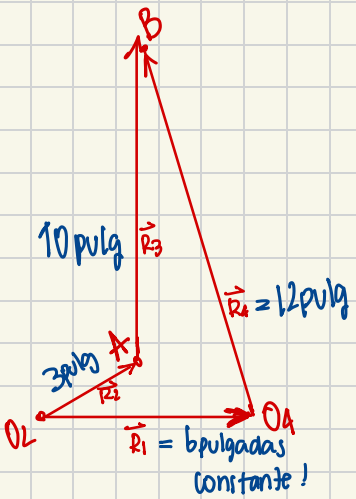
Parte 2	Velocidad angular en rad/s, masa en blobs, momento de inercia en blob-pulg²					
Fila	m_2	m_3	m_4	I_2	I_3	I_4
a.	0.002	0.02	0.10	0.10	0.20	0.50
b.	0.050	0.10	0.20	0.20	0.40	0.40

Parte 3	Longitudes en pulgadas, ángulos en grados, aceleraciones lineales en pulg/s²					
Fila	R_{g2} mag	R_{g2} ang	R_{g3} mag	R_{g3} ang	R_{g4} mag	R_{g4} ang
a.	2	0	5	0	4	30
b.	1	20	4	-30	6	40









$$x: R_2\cos\theta_2 + R_3\cos\theta_3 - R_1\cos\theta_1 - R_4\cos\theta_4 = 0$$
$$y: R_2\operatorname{sen}\theta_2 + R_3\operatorname{sen}\theta_3 - R_1\operatorname{sen}\theta_1 - R_4\operatorname{sen}\theta_4 = 0$$

1er derivada

$$x: -R_2\operatorname{sen}\theta_2\dot{\theta}_2 - R_3\operatorname{sen}\theta_3\dot{\theta}_3 + R_4\operatorname{sen}\theta_4\dot{\theta}_4 = 0$$
$$y: +R_2\cos\theta_2\dot{\theta}_2 + R_3\cos\theta_3\dot{\theta}_3 - R_4\cos\theta_4\dot{\theta}_4 = 0$$

2da derivada

$$x: -R_2\cos\theta_2\dot{\theta}_2^2 - R_2\operatorname{sen}\theta_2\ddot{\theta}_2 - R_3\cos\theta_3\dot{\theta}_3^2 - R_3\operatorname{sen}\theta_3\ddot{\theta}_3 + R_4\cos\theta_4\dot{\theta}_4^2 + R_4\operatorname{sen}\theta_4\ddot{\theta}_4 = 0$$
$$y: -R_2\operatorname{sen}\theta_2\dot{\theta}_2^2 + R_2\cos\theta_2\ddot{\theta}_2 - R_3\operatorname{sen}\theta_3\dot{\theta}_3^2 + R_3\cos\theta_3\ddot{\theta}_3 + R_4\operatorname{sen}\theta_4\dot{\theta}_4^2 - R_4\cos\theta_4\ddot{\theta}_4 = 0$$

Jacobiano !

$$\begin{pmatrix} -R_3\operatorname{sen}\theta_3 & +R_4\operatorname{sen}\theta_4 \\ R_3\cos\theta_3 & -R_4\cos\theta_4 \end{pmatrix}\begin{pmatrix} \dot\theta_3 \\ \dot\theta_4 \end{pmatrix} = \begin{pmatrix} R_2\operatorname{sen}\theta_2\dot\theta_2 \\ -R_2\cos\theta_2\dot\theta_2 \end{pmatrix}$$

(var: $-R_3\operatorname{sen}\theta_3$, $+R_4\operatorname{sen}\theta_4$, $\dot\theta_3$)

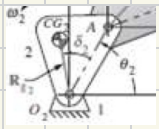
Velocidad angular!

$$\begin{pmatrix} -R_3\operatorname{sen}\theta_3 & R_4\operatorname{sen}\theta_4 \\ R_3\cos\theta_3 & -R_4\cos\theta_4 \end{pmatrix}\begin{pmatrix} \ddot\theta_3 \\ \ddot\theta_4 \end{pmatrix} = \begin{pmatrix} R_2\cos\theta_2\dot\theta_2^2 + R_3\cos\theta_3\dot\theta_3^2 - R_4\cos\theta_4\dot\theta_4^2 \\ R_2\operatorname{sen}\theta_2\dot\theta_2^2 + R_3\operatorname{sen}\theta_3\dot\theta_3^2 - R_4\operatorname{sen}\theta_4\dot\theta_4^2 \end{pmatrix}$$

($\ddot\theta_4$: var)

aceleración angular !

Eslabón 2



$$\vec V_A = \vec V_{O2} + \vec V + \vec\omega_2\times\vec R_2$$
$$\vec V_A = \vec\omega_2\times(R_2\cos\theta_2\uparrow + R_2\operatorname{sen}\theta_2\uparrow)$$

($\vec\omega_2$: cst; θ_2: var; R_2: var)

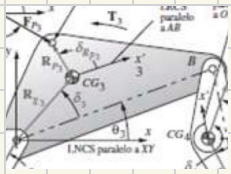
$$\vec V_{g2} = \vec V_{O2} + \vec V + \vec\omega_2\times\vec R_{g2}$$
$$\vec V_{g2} = \vec\omega_2\times(R_{g2}\cos(\delta_2+\theta_2)\uparrow + R_{g2}\operatorname{sen}(\delta_2+\theta_2)\uparrow)$$

($\vec\omega_2$: cst; δ_2: cst; θ_2: var; R_{g2}: cst; delta2; θ_2: var)

$$\vec A_A = \vec A_{O2} + \vec A + (\vec\alpha_2\times\vec R_2) + 2(\vec\omega_2\times\vec V) + \vec\omega_2\times(\vec\omega_2\times\vec R_2)$$
$$\vec A_A = \vec\omega_2\times(\vec\omega_2\times(R_2\cos\theta_2\uparrow + R_2\operatorname{sen}\theta_2\uparrow)$$

$$\vec A_{g2} = \vec A_{O2} + \vec A + (\alpha_2\times R_{g2}) + 2(\vec\omega_2\times\vec V) + \omega_2\times(\omega_2\times R_{g2})$$
$$\vec A_{g2} = \omega_2\times(\omega_2\times(R_{g2}\cos(\delta_2+\theta_2)\uparrow + R_{g2}\operatorname{sen}(\delta_2+\theta_2)\uparrow)$$

Eslabón 3



$$\vec V_B = V_A + V + \vec\omega_3\times\vec R_3$$
$$\vec V_B = \vec V_A + \vec\omega_3\times(R_3\cos\theta_3\uparrow + R_3\operatorname{sen}\theta_3\uparrow)$$

(omeg; var; var; var; cst; var)

$$\vec V_{g3} = \vec V_A + \vec\omega_3\times R_{g3}$$
$$\vec V_{g3} = \vec V_A + \vec\omega_3\times(R_{g3}\cos(\delta_3+\theta_3)\uparrow + R_{g3}\operatorname{sen}(\delta_3+\theta_3)\uparrow)$$

(delta 3; var; var; var; cst; cst; var)

$$\vec A_B = \vec A_A + \vec A + (\alpha_3\times R_3) + 2(\omega_3\times V) + \omega_3\times(\omega_3\times R_3)$$
$$\vec A_B = \vec A_A + (\vec\alpha_3\times(R_3\cos\theta_3\uparrow + R_3\operatorname{sen}\theta_3\uparrow)) + \omega_3\times(\omega_3\times(R_3\cos\theta_3\uparrow + R_3\operatorname{sen}\theta_3\uparrow))$$

$$\vec A_{g3} = \vec A_A + (\vec\alpha_3\times(R_{g3}\cos(\delta_3+\theta_3)\uparrow + R_{g3}\operatorname{sen}(\delta_3+\theta_3)\uparrow)) + \omega_3\times(\omega_3\times(R_{g3}\cos(\delta_3+\theta_3)\uparrow + R_{g3}\operatorname{sen}(\delta_3+\theta_3)\uparrow))$$

Eslabón 4

$$\vec V_C = \vec V_B + \vec V + \omega_4\times\vec R_4$$
$$\vec V_C = \vec V_B + \vec\omega_4\times(R_4\cos\theta_4\uparrow + R_4\operatorname{sen}\theta_4\uparrow)$$

(var; var; var; cst; var)

$$\vec V_{g4} = \vec V_B + \vec\omega_4\times\vec R_{g4}$$
$$\vec V_{g4} = \vec V_B + \vec\omega_4\times(R_{g4}\cos(\delta_4+\theta_4)\uparrow + R_{g4}\operatorname{sen}(\delta_4+\theta_4)\uparrow)$$

(delta4; var; var; var; cst; cst; var)

$$\vec A_C = \vec A_B + \vec A + (\vec\alpha_4\times\vec R_4) + 2(\vec\omega_4\times\vec V) + (\vec\omega_4\times(\vec\omega_4\times\vec R_4)$$
$$\vec A_C = \vec A_B + (\vec\alpha_4\times(R_4\cos\theta_4\uparrow + R_4\operatorname{sen}\theta_4\uparrow)) + \omega_4\times(\omega_4\times(R_4\cos\theta_4\uparrow + R_4\operatorname{sen}\theta_4\uparrow))$$

$$\vec A_{g4} = \vec A_B + (\vec\alpha_4\times(R_{g4}\cos(\delta_4+\theta_4)\uparrow + R_{g4}\operatorname{sen}(\delta_4+\theta_4)\uparrow)) + (\omega_4\times(\omega_4\times(R_{g4}\cos(\delta_4+\theta_4)\uparrow + R_{g4}\operatorname{sen}(\delta_4+\theta_4)\uparrow))$$