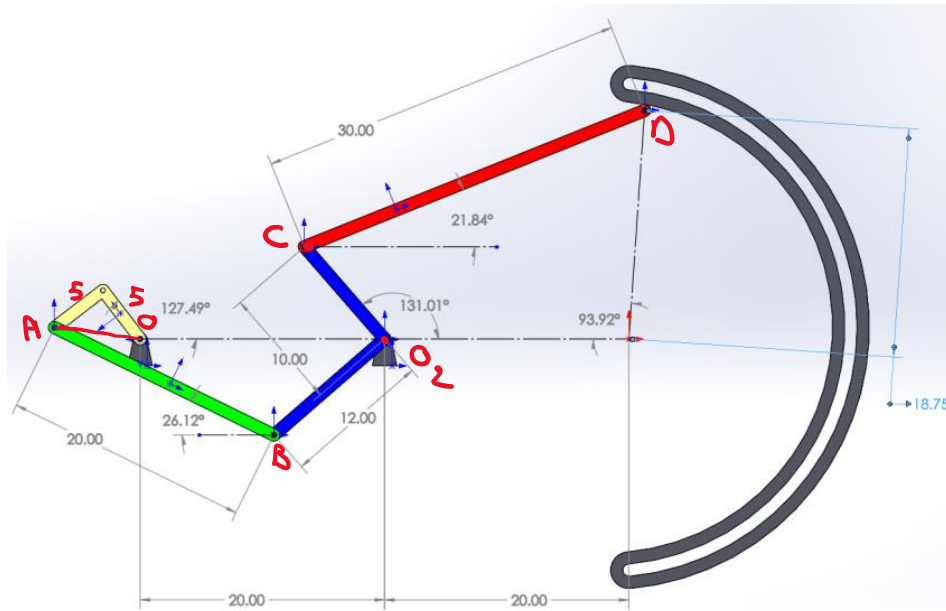
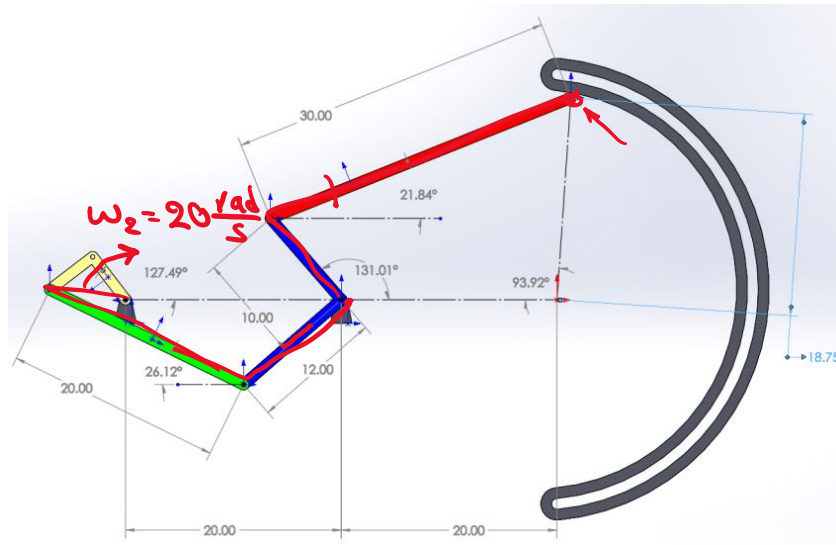
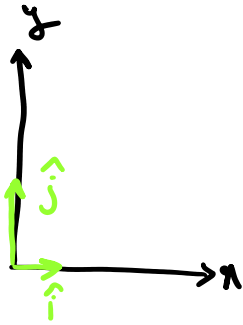


Kinematics midterm exam 00011

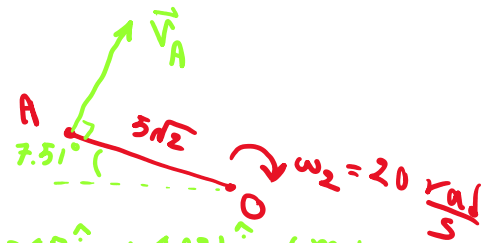
Tuesday, January 18, 2022 3:33 PM

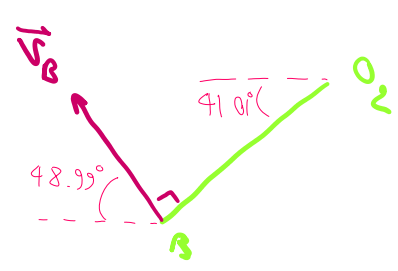
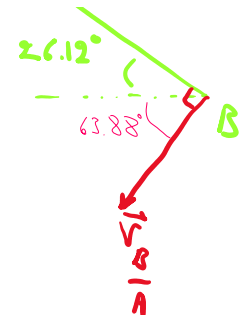
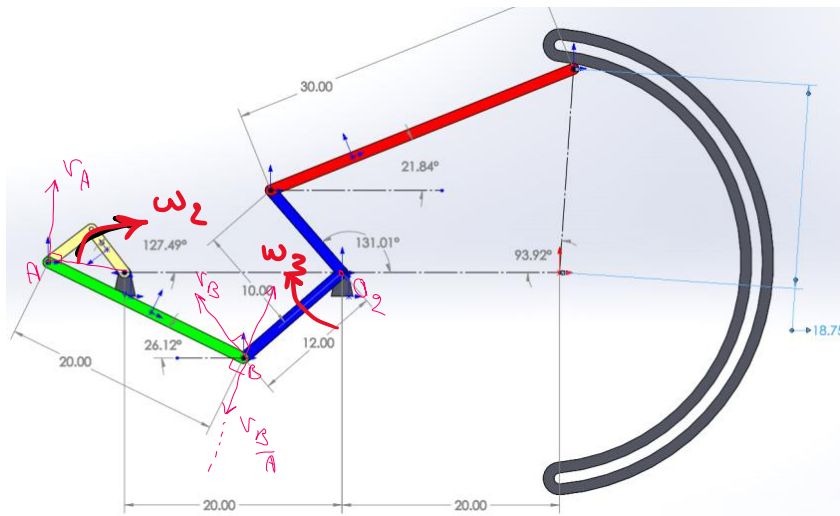


$$\overline{OA} = 5\sqrt{2} \text{ cm} = 5\sqrt{2} \times 10^{-2} \text{ m}$$

$$v_A = r\omega_2 = 5\sqrt{2} \times 10^{-2} \times 20 = 1.4142 \frac{\text{m}}{\text{s}}$$

$$\vec{v}_A = 1.4142 [\cos(82.49)\hat{i} + \sin(82.49)\hat{j}] = 0.1848\hat{i} + 1.4021\hat{j} \left(\frac{\text{m}}{\text{s}}\right)$$





$$\vec{v}_B = \vec{v}_A + \vec{v}_{B/A}$$

$$\vec{v}_B [-\cos(48.99)\hat{i} + \sin(48.99)\hat{j}]$$

$$= 0.1848\hat{i} + 1.4021\hat{j} + v_{B/A} [-\cos(63.88)\hat{i} - \sin(63.88)\hat{j}] \Rightarrow$$

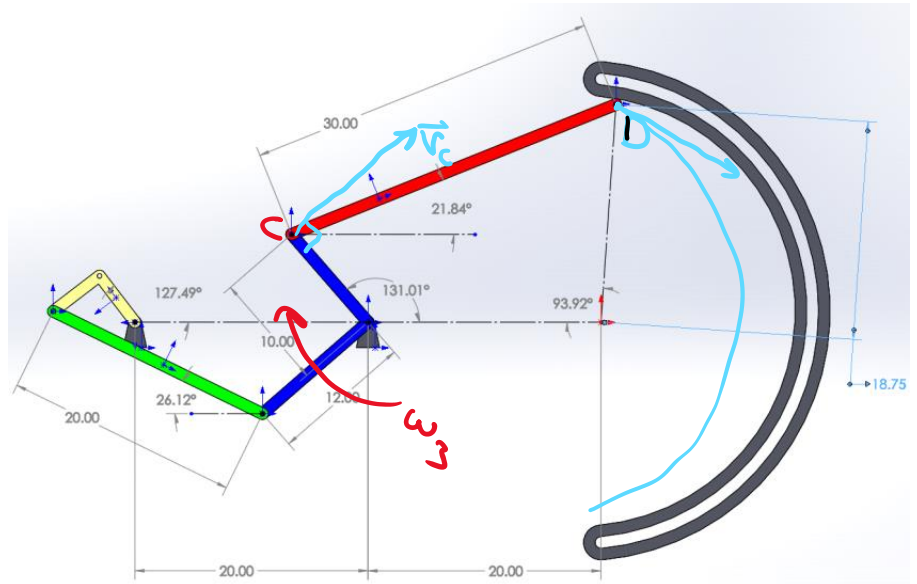
$$\begin{cases} \hat{i} \Rightarrow -v_B \cos 48.99 + v_{B/A} \cos 63.88 = 0.1848 \\ \hat{j} \Rightarrow v_B \sin 48.99 + v_{B/A} \sin 63.88 = 1.4201 \end{cases} \quad \left. \vphantom{\begin{cases} \hat{i} \\ \hat{j} \end{cases}} \right\} \text{دو معادله دو مجهول}$$

$$\Rightarrow \begin{cases} v_B = 0.4985 \frac{m}{s} \Rightarrow \vec{v}_B = 0.4985 [-\cos(48.99)\hat{i} + \sin(48.99)\hat{j}] \\ v_{B/A} = 1.1627 \frac{m}{s} \Rightarrow \vec{v}_{B/A} = 1.1627 [-\cos(63.88)\hat{i} - \sin(63.88)\hat{j}] \end{cases}$$

$$\Rightarrow \begin{cases} \vec{v}_B = -0.3271\hat{i} + 0.3762\hat{j} \frac{m}{s} \\ \vec{v}_{B/A} = -0.5119\hat{i} - 1.0440\hat{j} \frac{m}{s} \end{cases}$$

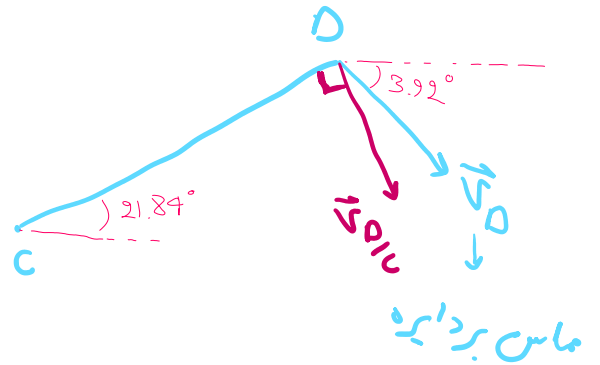
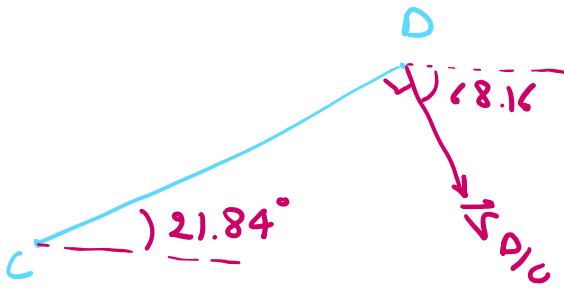
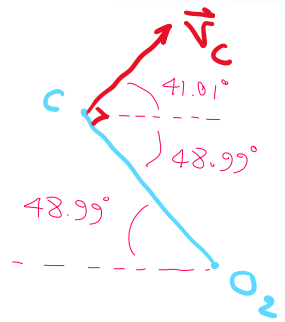
$$v_B = 0.4985 \frac{m}{s} \Rightarrow \omega_3 = \frac{v_B}{0.12} = \frac{0.4985}{0.12} = 4.0792 \frac{rad}{s} \quad \checkmark$$

$$v_{B/A} = 1.1627 \frac{m}{s} \Rightarrow \omega_{AB} = \frac{v_{A/B}}{AB} = \frac{1.1627}{0.2} = 5.8135 \frac{rad}{s} \quad \checkmark$$



$$v_C = r\omega_3 = 0.1 \times 4.0729 = 0.40729 \frac{m}{s} \Rightarrow$$

$$\vec{v}_C = 0.40729 [\cos(41.01)\hat{i} + \sin(41.01)\hat{j}] \frac{m}{s}$$



$$\vec{v}_D = \vec{v}_C + \vec{v}_{D/C}$$

$$v_D [\cos(3.92)\hat{i} - \sin(3.92)\hat{j}] = 0.40729 [\cos(41.01)\hat{i} + \sin(41.01)\hat{j}]$$

$$+ v_{D/C} [\cos(68.16)\hat{i} - \sin(68.16)\hat{j}] \Rightarrow$$

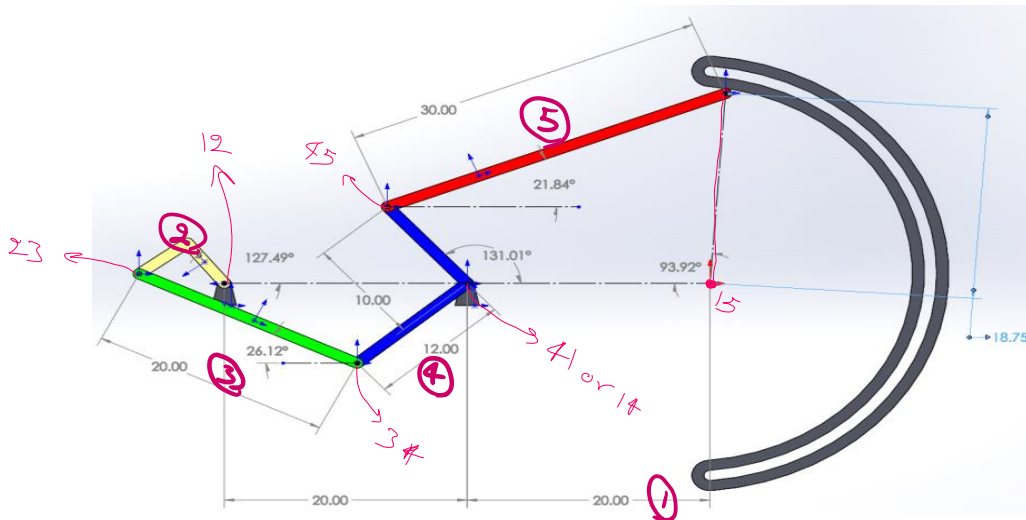
$$\hat{i} \left\{ \begin{aligned} v_D \cos 3.92 - v_{D/C} \cos 68.16 &= 0.40729 \cos 41.01 \\ -v_D \sin 3.92 + v_{D/C} \sin 68.16 &= 0.40729 \sin 41.01 \end{aligned} \right. \Rightarrow$$

$$\hat{j} \left\{ -v_D \sin 3.92 + v_{D/C} \sin 68.16 = 0.40729 \sin 41.01 \right.$$

$$v_D = 0.4272 \frac{m}{s}$$

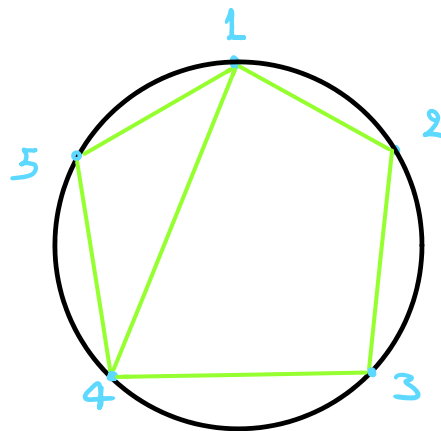
$$v_{D/C} = 0.3194 \frac{m}{s} \Rightarrow \omega_{CD} = \frac{v_{D/C}}{CD} = \frac{0.3194}{0.3} = 1.0647 \frac{rad}{s}$$

$$\Rightarrow \begin{cases} \vec{v}_D = 0.4262 \hat{i} - 0.0292 \hat{j} & \frac{m}{s} \\ \vec{v}_{D/C} = 0.1188 \hat{i} - 0.2965 \hat{j} & \frac{m}{s} \end{cases}$$

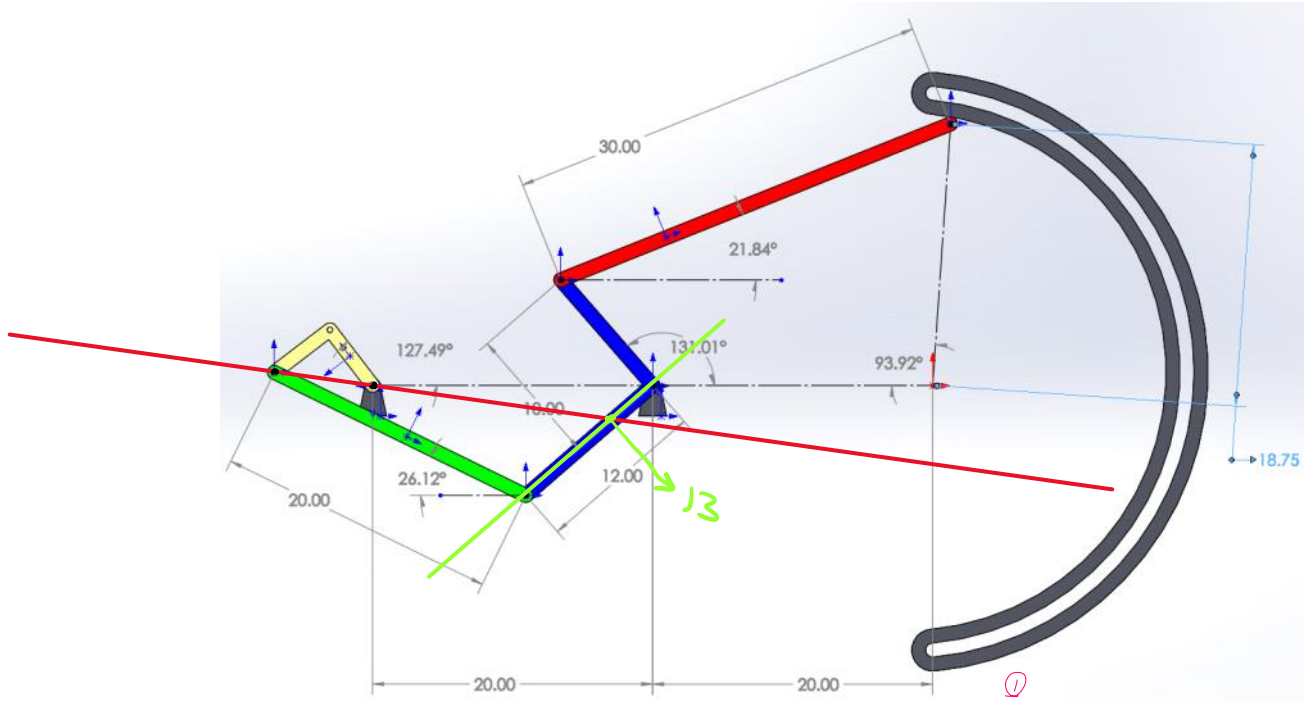


$$n = 5$$

$$N = \frac{5(5-1)}{2} = 10$$

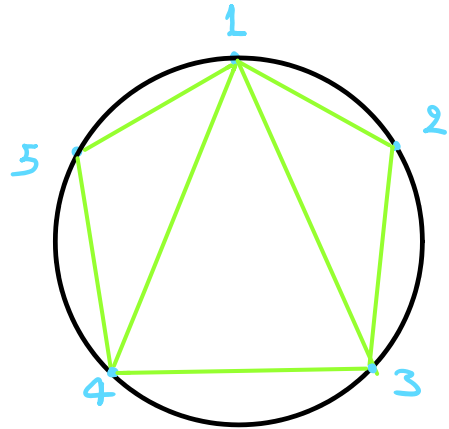
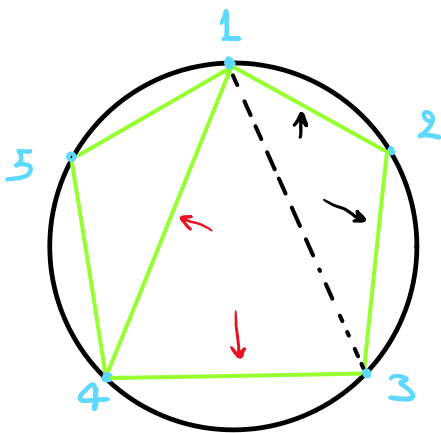


1 مصلب



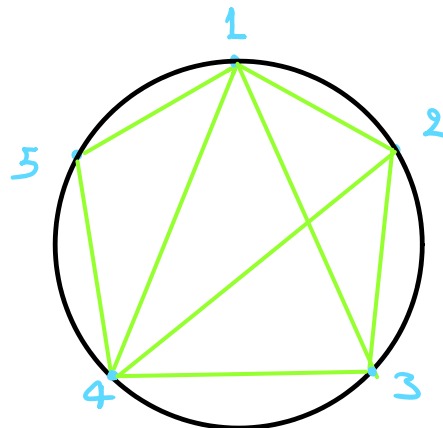
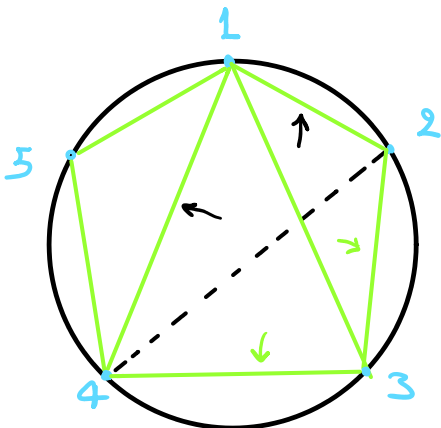
$\triangle 123$ and $\triangle 134$

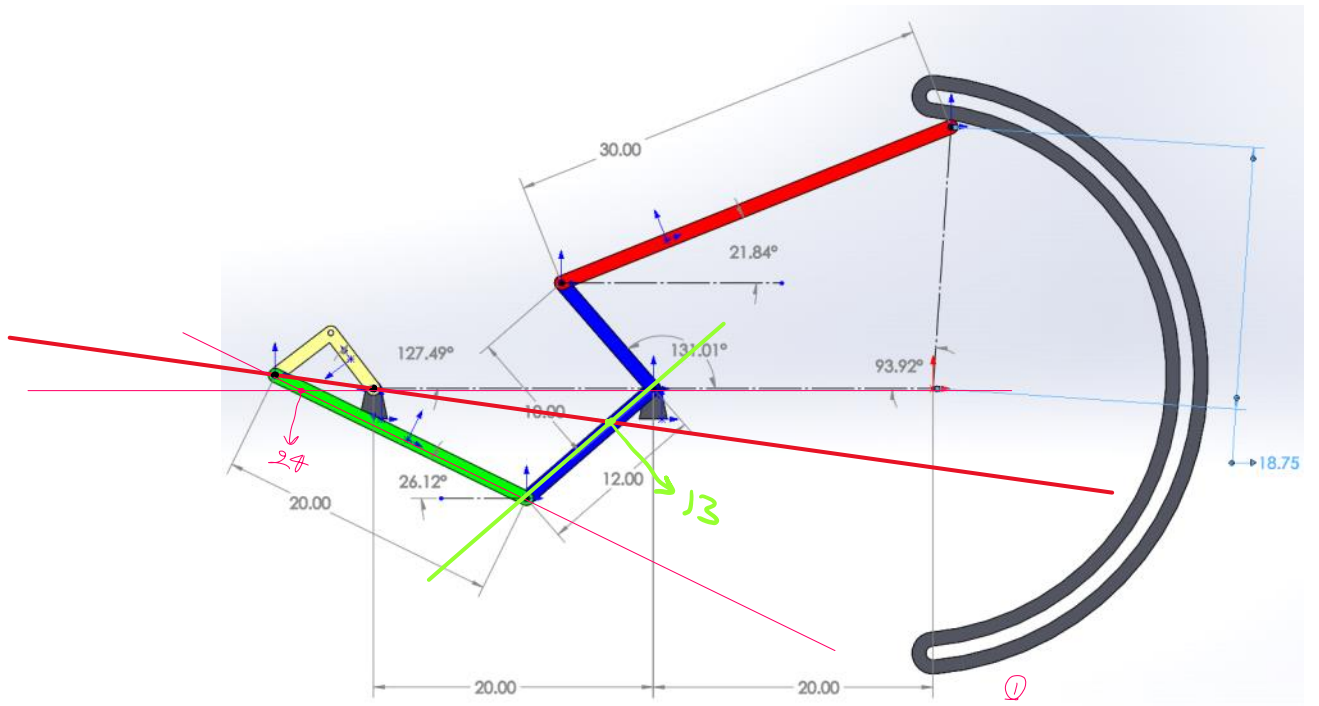
مرحله 2



$\triangle 124$ and $\triangle 234$

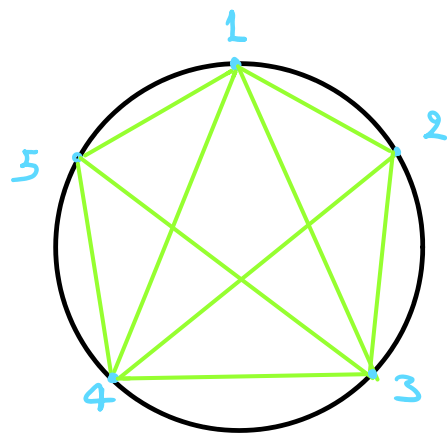
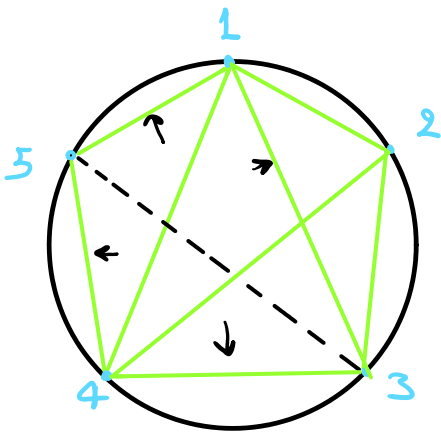
مرحله سوم

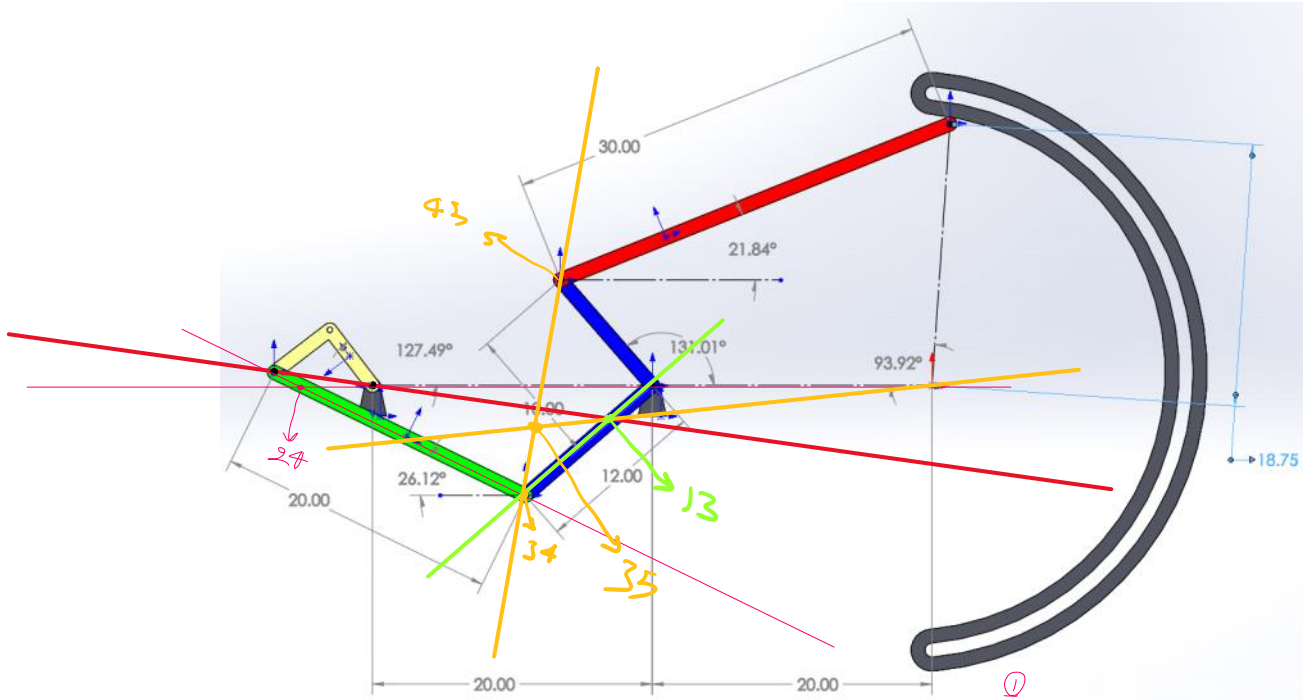




مرحله 4

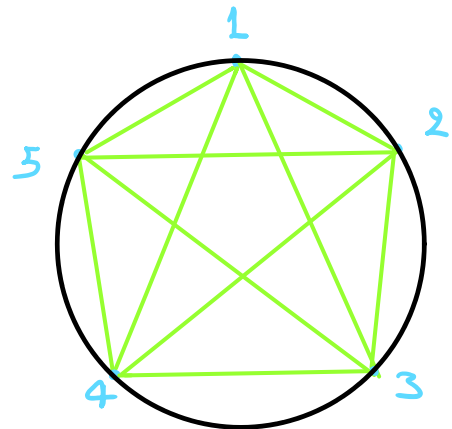
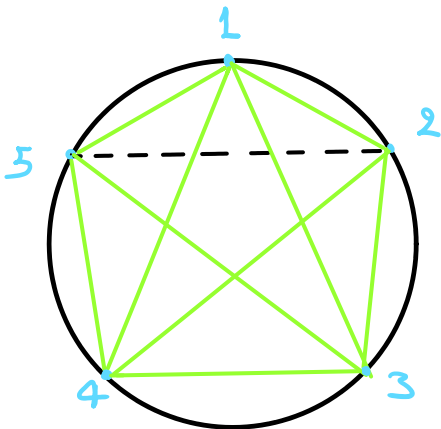
\triangle 135 \triangle 345
 135 345

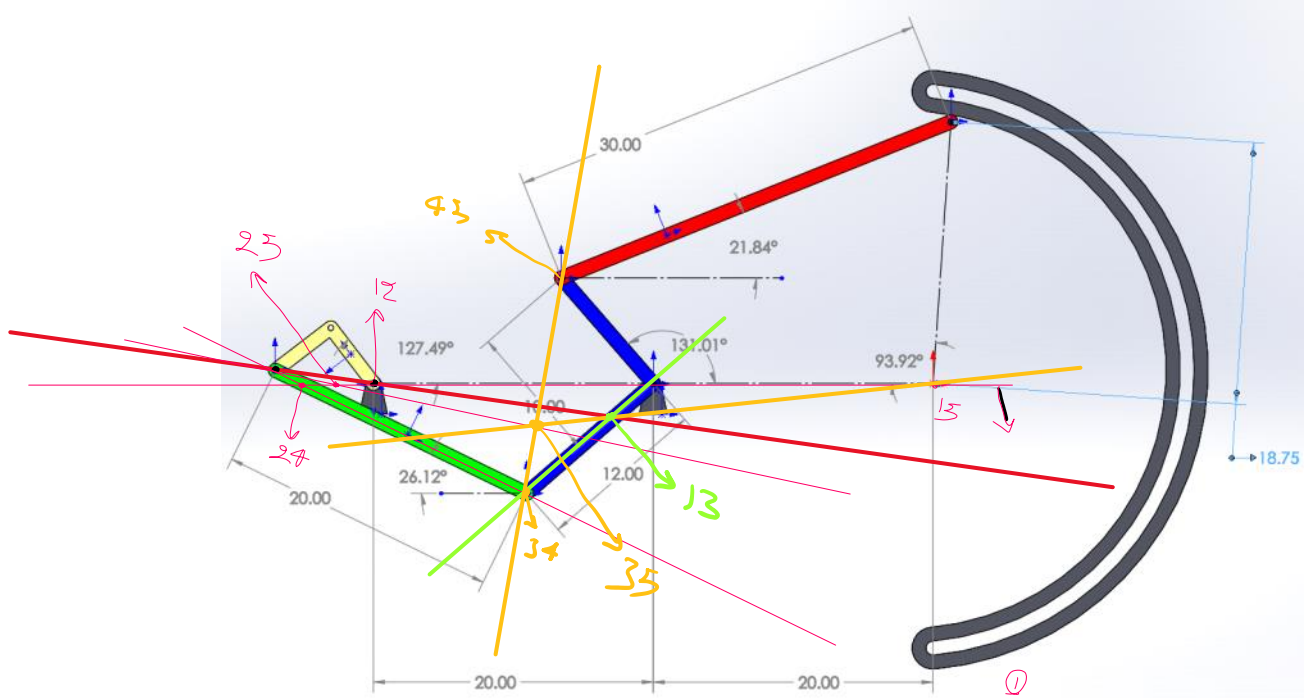




مرحله 5

\triangle_{123} \triangle_{235} \triangle_{243}





به دلیل اینکه خط لسن کامپوتر دارای دنت مدالتر ۱ درجه است، خط‌هایی دارد
 من خواهد شد که در روی کاغذ این خط‌ها کمتر هستند.