

PROBLEM 4-12a | GIVEN AN INVERTED SLIDER CRANK WITH A GROUND LINK $d=6$, DRIVE LINK $a=2$, FOLLOWER LINK $c=4$, ANGLE $\theta_2 = 30^\circ$, AND A OFFSET FOLLOWER SLIDE ANGLE $\gamma = 0^\circ$. DEVELOPE AN ALGORITHM TO LOCATE ALL POINTS ON THE MECHANISM.

GIVEN:

1. INVERTED SLIDER CRANK SHOWN IN THE FIGURE BELOW.
2. DIMENSIONS: $d=6$, $a=2$, $c=4$, $\theta_2 = 30^\circ$, AND $\gamma = 0^\circ$ (SLIDE \perp TO RACKER)

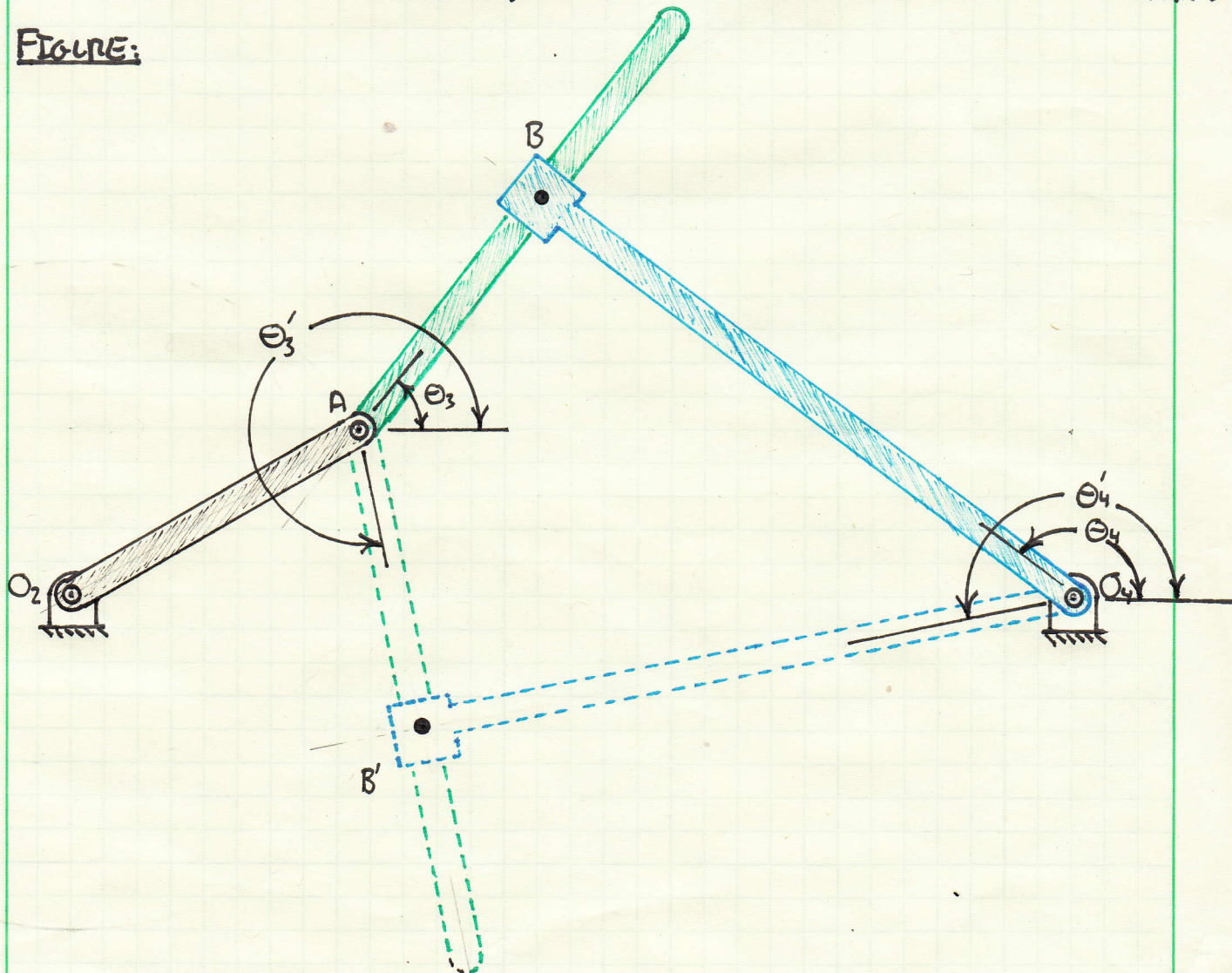
ASSUMPTIONS:

1. THE MOTION OF ALL THE COMPONENTS ARE IN A SINGLE PLANE OR PARALLEL PLANES
2. ALL LINKS ARE RIGID
3. ALL JOINTS ARE FRICTIONLESS

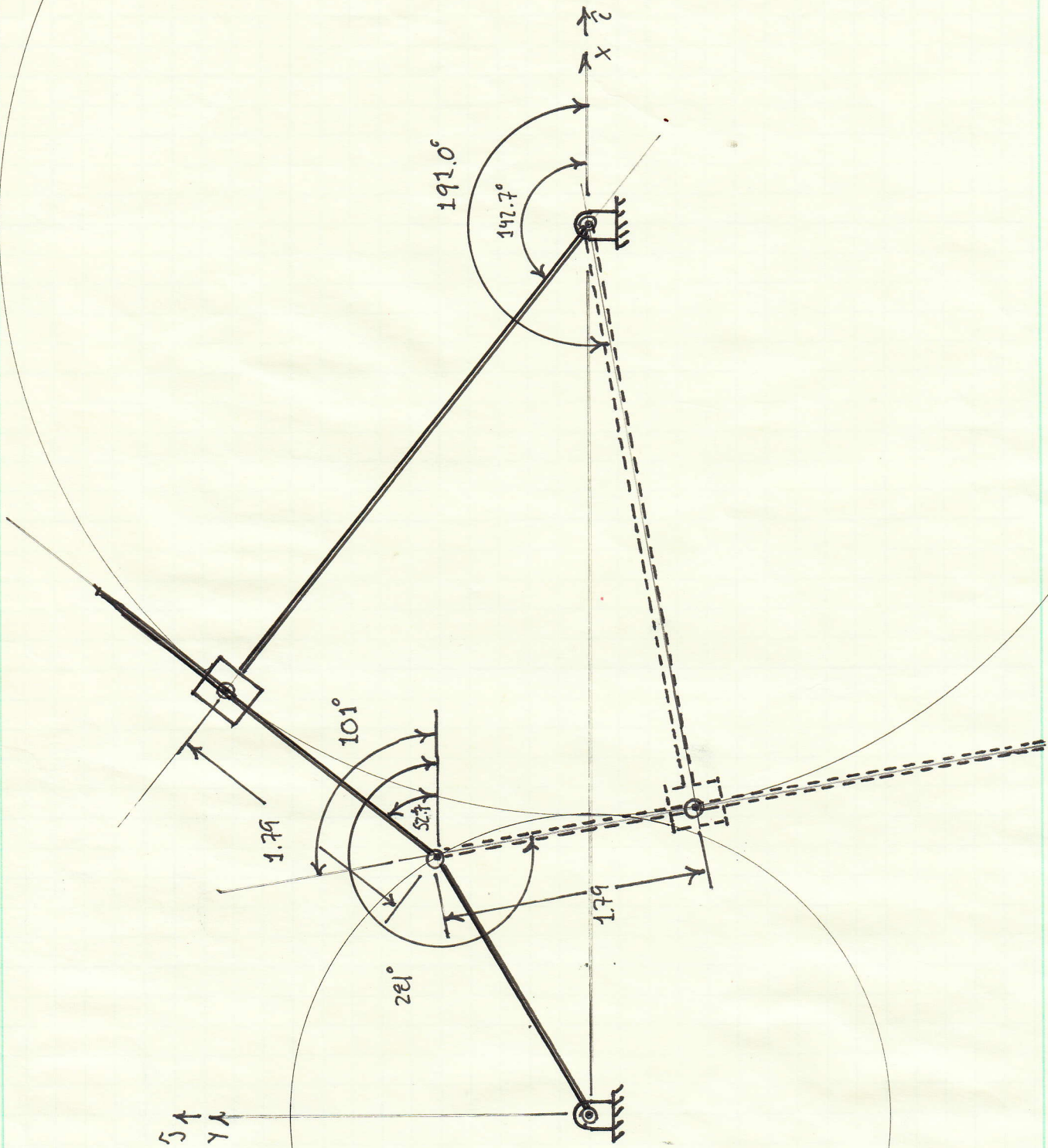
FIND:

1. FIND THE POSITION OF "A" AND "B" FOR BOTH THE OPEN AND CLOSED ^{CONFIGURATIONS} POS.
2. FIND THE ANGLES θ_3 AND θ_4 FOR BOTH THE OPEN AND CLOSED ^{CONFIGURATIONS} POS.

FIGURE:



②



Problem 4-11a

LINK 1: 6
LINK 2: 2
LINK 4: 4
Y: 0
Θ: 30

51
YA

a=	2	Link 2
c=	4	Link 4
d=	6	Link 1
$\theta_2 =$	30	
$\gamma =$	0	

$\zeta =$	90
K1=	-1
K2=	4.267949192
K3=	4

$\tilde{b} =$	1.79	-1.79
$\theta_4 =$	142.67	-169.04
$\theta_3 =$	52.67	-259.04

	x comp		y comp		mag		angle		e_r		e_θ	
									i	j	i	j
rO4=	6.00	0.00	6.00	0.0	1.000	0.000	0.000	1.000	0.000	0.000	0.000	1.000
rA=	1.73	1.00	2.00	30.0	0.866	0.500	-0.500	0.866	0.866	0.500	-0.500	0.866
rBA=	1.09	1.43	1.79	52.7	0.606	0.795	-0.795	0.606	0.606	0.795	-0.795	0.606
rBO4=	-3.18	2.43	4.00	142.7	-0.795	0.606	-0.606	-0.795	-0.795	0.606	-0.606	-0.795
rB=	2.82	2.43	3.72	40.7	0.758	0.652	-0.652	0.758	0.758	0.652	-0.652	0.758

alt	x comp	y comp	mag	angle	i	j	i	j
rO4=	6.00	0.00	6.00	0.0	1.000	0.000	0.000	1.000
rA=	1.73	1.00	2.00	30.0	0.866	0.500	-0.500	0.866
rBA=	0.34	-1.76	1.79	-79.0	0.190	-0.982	0.982	0.190
rBO4=	-3.93	-0.76	4.00	-169.0	-0.982	-0.190	0.190	-0.982
rB=	2.07	-0.76	2.21	-20.1	0.939	-0.344	0.344	0.939

Summary:

THE CONSTRUCTION OF THE CONFIGURATION IS A BIT TRICKY, BUT IS EXTREMELY HELPFUL IN THE INTERPRETATION OF THE RESULTS. THE SOLUTION THAT THE ALGORITHM PRODUCES OF THE "CLOSED" OR "ALT" CASE GIVES A $-b$ VALUE AND A θ_3 IN THE SECOND QUADRANT. THIS DOES NOT APPEAR TO BE CONSISTANT WITH THE CONSTRUCTION UNTIL A CLOSER INVESTIGATION SHOWS THAT THE ANGLE POINTS TO AN AXIS THAT IS 180° FROM THE ALT SOLUTIONS AXIS WHICH EXPLAINS THE $-b$ VALUE.