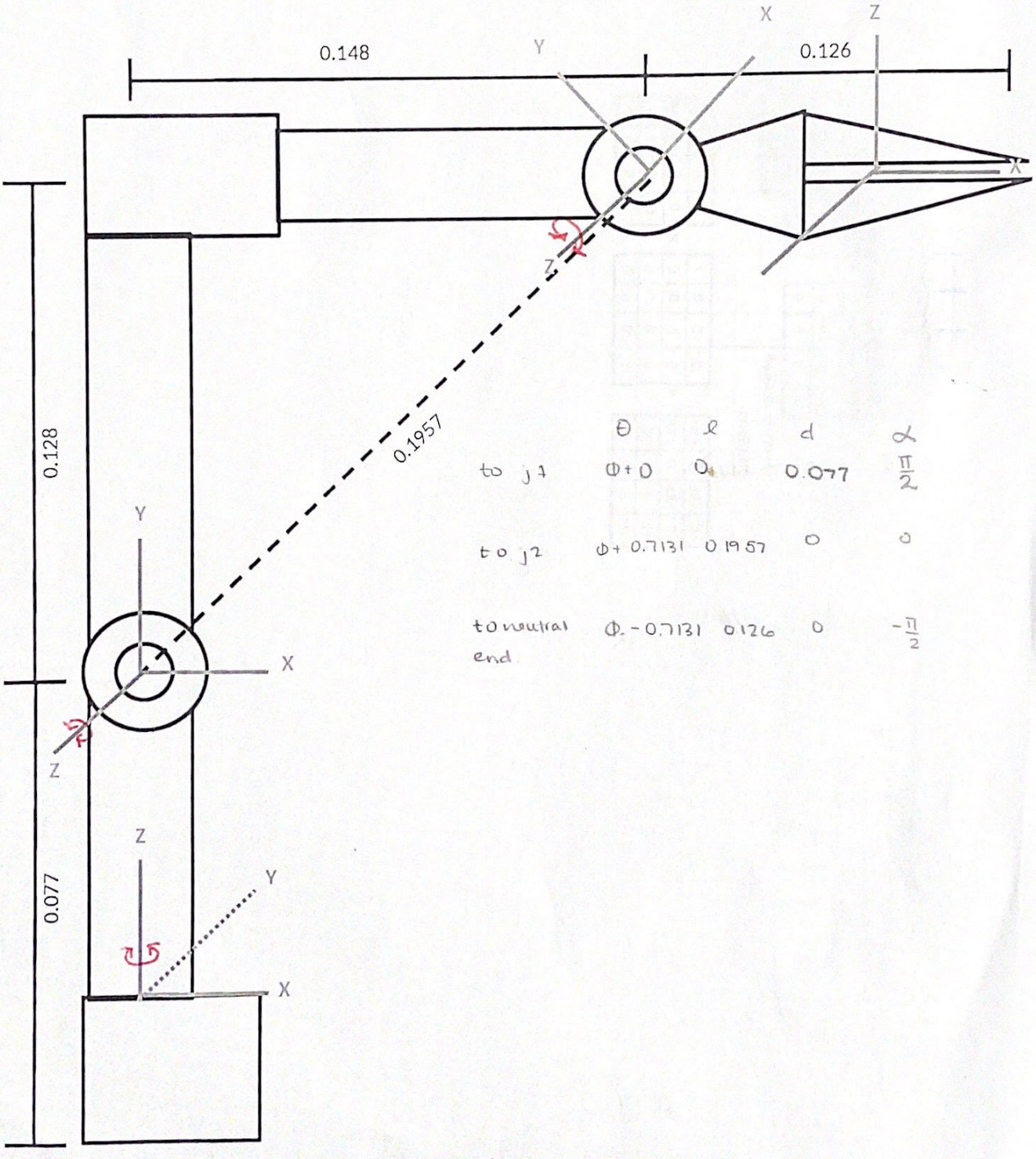

	θ	ℓ	d	α
to j1	$\Phi + 0$	0	0.077	$\frac{\pi}{2}$
to j2	$\Phi + 0.7131$	0.1957	0	0
to neutral end	$\Phi - 0.7131$	0126	0	$-\frac{\pi}{2}$

Joint 1

Rotation Z			
cθ1	-sθ1	0	0
sθ1	cθ1	0	0
0	0	1	0
0	0	0	1

x

Translation Z			
1	0	0	0
0	1	0	0
0	0	1	d1
0	0	0	1

x

Rotation X			
1	0	0	0
0	cα1	-sα1	0
0	sα1	cα1	0
0	0	0	1

Reduce: s(π/2) = 1

c(π/2) = 0

cθ1	-sθ1	0	0
sθ1	cθ1	0	0
0	0	1	d1
0	0	0	1

x

1	0	0	0
0	0	-1	0
0	1	0	0
0	0	0	1

=

cθ1	0	sθ1	0
sθ1	0	-cθ1	0
0	1	0	d1
0	0	0	1

Full Move List								
Joint	**θ**		**l**		**d**		**α**	
J1	φ + 0	θ1	0	l1	0.077	d1	π/2	α1
J2	φ + 0.7131	θ2	0.1957	l2	0	d2	0	α2
J3	φ - 0.7131	θ3	0.126	l3	0	d3	-π/2	α3

Joint 2

Rotation Z			
cθ2	-sθ2	0	0
sθ2	cθ2	0	0
0	0	1	0
0	0	0	1

x

Translation X			
1	0	0	l2
0	1	0	0
0	0	1	0
0	0	0	1

cθ2	-sθ2	0	cθ2*l2
sθ2	cθ2	0	sθ2*l2
0	0	1	0
0	0	0	1

Full Move List								
Joint	**θ**		**l**		**d**		**α**	
J1	φ + 0	θ1	0	l1	0.077	d1	π/2	α1
J2	φ + 0.7131	θ2	0.1957	l2	0	d2	0	α2
J3	φ - 0.7131	θ3	0.126	l3	0	d3	-π/2	α3

Joint 3

Rotation Z			
cθ1	-sθ1	0	0
sθ1	cθ1	0	0
0	0	1	0
0	0	0	1

Translation X			
1	0	0	l3
0	1	0	0
0	0	1	0
0	0	0	1

Rotation X			
1	0	0	0
0	cα1	-sα1	0
0	sα1	cα1	0
0	0	0	1

Reduce: s(-π/2) = -1

c(π/2) = 0

cθ3	-sθ3	0	cθ3*l3
sθ3	cθ3	0	sθ3*l3
0	0	1	0
0	0	0	1

x

1	0	0	0
0	0	1	0
0	-1	0	0
0	0	0	1

=

cθ3	0	-sθ3	cθ3*l3
sθ3	0	cθ3	sθ3*l3
0	-1	0	0
0	0	0	1

Full Move List							
Joint	**θ**		**l**		**d**		**α**	
J1	φ + 0	θ1	0	l1	0.077	d1	π/2	α1
J2	φ + 0.7131	θ2	0.1957	l2	0	d2	0	α2
J3	φ - 0.7131	θ3	0.126	l3	0	d3	-π/2	α3

Combination

Joint 1			
cθ1	0	sθ1	0
sθ1	0	-cθ1	0
0	1	0	d1
0	0	0	1

Joint 2			
cθ2	-sθ2	0	cθ2*l2
sθ2	cθ2	0	sθ2*l2
0	0	1	0
0	0	0	1

Joint 3			
cθ3	0	-sθ3	cθ3*l3
sθ3	0	cθ3	sθ3*l3
0	-1	0	0
0	0	0	1

Full Move List							
Joint	θ		l		d		α	
J1	φ + 0	θ1	0	l1	0.077	d1	π/2	α1
J2	φ + 0.7131	θ2	0.1957	l2	0	d2	0	α2
J3	φ - 0.7131	θ3	0.126	l3	0	d3	-π/2	α3

c(θ2+θ3)	0	-s(θ2+θ3)	l3(c(θ2+θ3)) + c(θ2*l2
s(θ2+θ3)	0	c(θ2+θ3)	l3(s(θ2+θ3)) + c(θ2*l2
0	-1	0	0
0	0	0	1

c(θ2+θ3)	0	-s(θ2+θ3)	l3(c(θ2+θ3)) + cθ2*l2
s(θ2+θ3)	0	c(θ2+θ3)	l3(s(θ2+θ3)) + cθ2*l2
0	-1	0	0
0	0	0	1

c(θ2+θ3)	0	-s(θ2+θ3)	l3(c(θ2+θ3)) + cθ2*l2
s(θ2+θ3)	0	c(θ2+θ3)	l3(s(θ2+θ3)) + cθ2*l2
0	-1	0	0
0	0	0	1

Reduced With Trig Identities:		
	cφcθ - sφsθ =	c(φ + θ)
	sφcθ + cφsθ =	s(φ + θ)

cθ1c(θ2+θ3)	-sθ1	-cθ1s(θ2+θ3)	cθ1(l3(c(θ2+θ3)) + cθ2*l2)
sθ1s(θ2+θ3)	cθ1	-sθ1s(θ2+θ3)	sθ1(l3(c(θ2+θ3)) + cθ2*l2)
s(θ2+θ3)	0	c(θ2+θ3)	l3(s(θ2+θ3)) + cθ2*l2 + d1
0	0	0	1

θ1	= arctan2(T[0,1], T[1,1])
θ2	sθ2 = ((T[0,3]/cθ1) - (T[2,2] l3)) / l2 cθ2 = ((T[2,3] - d1) - T[2,0] l3) / l2 = arctan2(sθ2, cθ2)
θ3	= arctan2(T[2,0], T[2,2]) - θ2

✓ ✓

θ_2: sin 2: $P_z = l_3 * s(\theta_2 + \theta_3) + d_1 + s\theta_2 * l_2 \Rightarrow \frac{P_z - l_3 * s(\theta_2 + \theta_3) - d_1}{l_2} = s\theta_2 \Rightarrow s\theta_2 = \frac{T[2,3] - L_3 * T[0,2] - D1}{L_2}$

cos 2: $P_x = c\theta_1 (l_3 * c(\theta_2 + \theta_3)) + c\theta_2 * l_2) \Rightarrow \frac{P_x}{c\theta_1} = l_3 * c(\theta_2 + \theta_3) + c\theta_2 * l_2 \Rightarrow c\theta_2 = \frac{\frac{P_x}{c\theta_1} - l_3 * c(\theta_2 + \theta_3)}{L_2}$

$c\theta_2 = \frac{\frac{T[0,3]}{T[1,1]} - L_3 * T[2,2]}{L_2}$