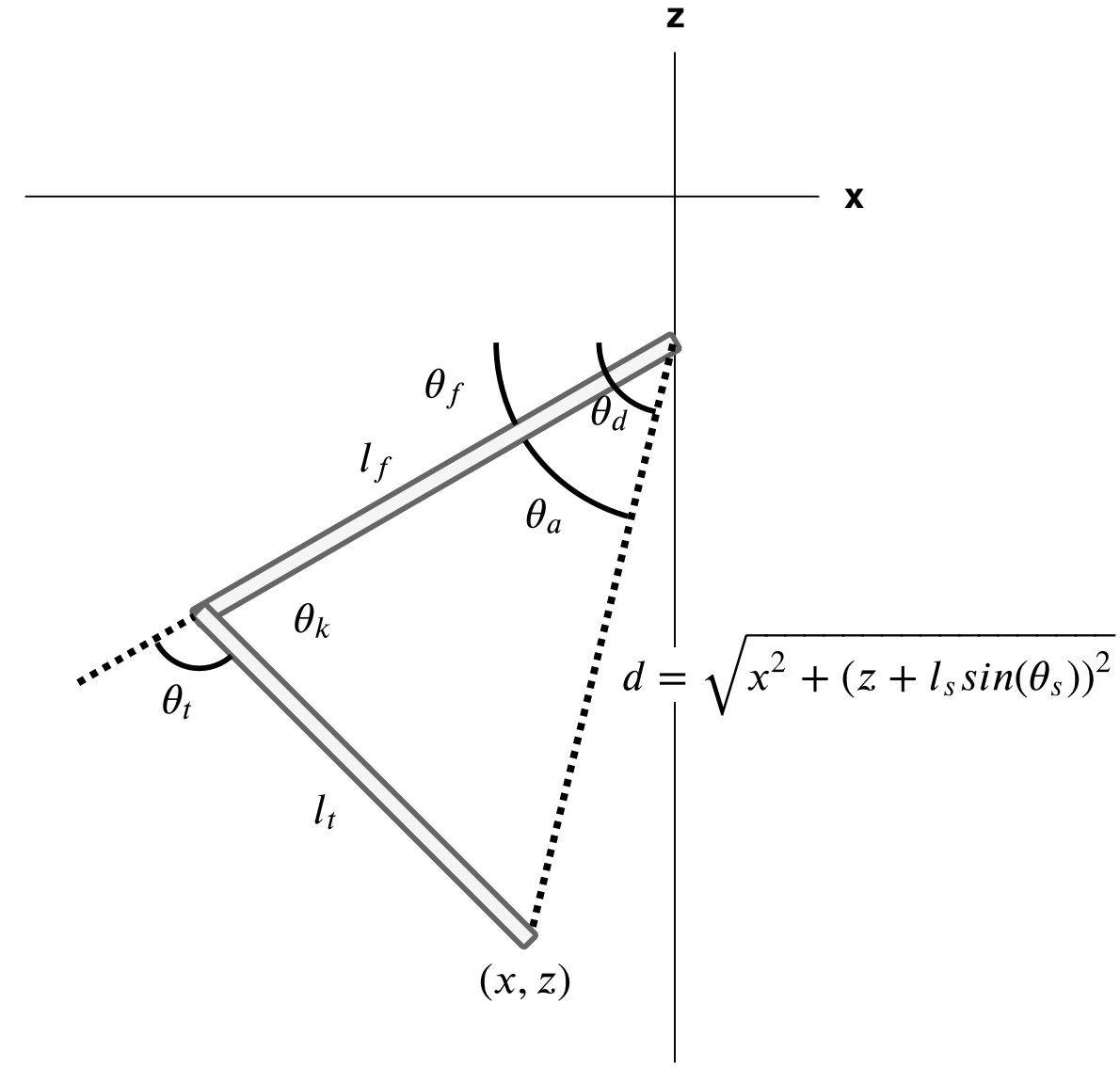
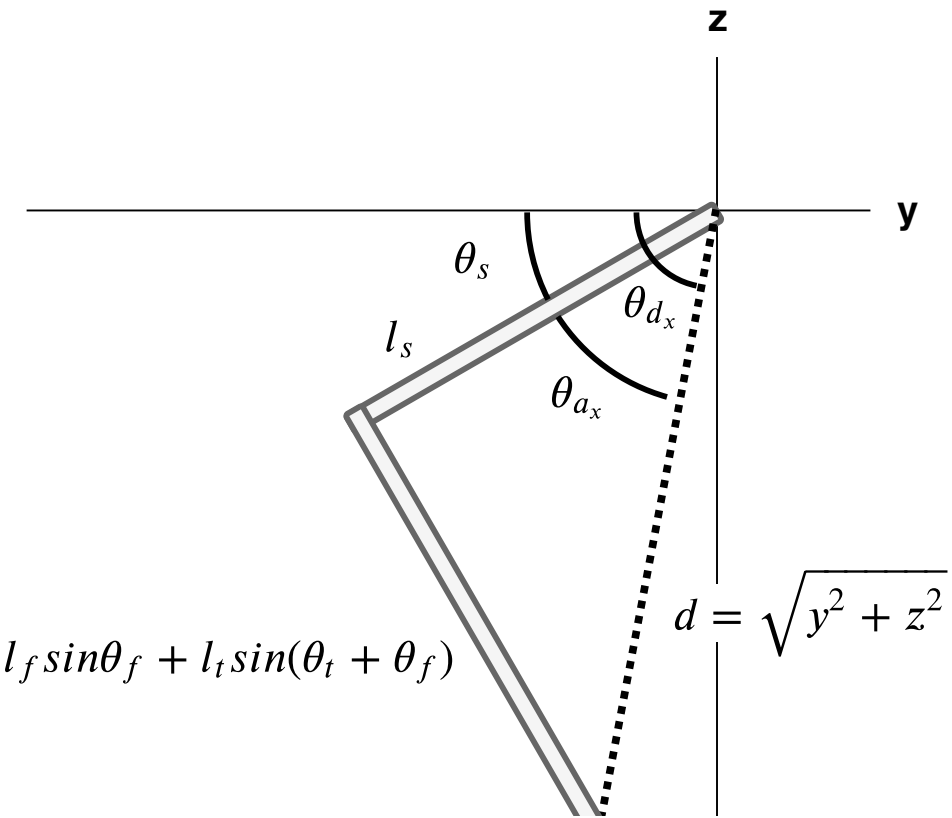
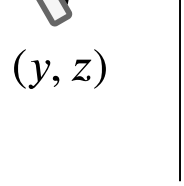

z
x
θ_f
θ_d
l_f
θ_a
θ_k
θ_t
l_t
(x, z)
$d = \sqrt{x^2 + (z + l_s sin(\theta_s))^2}$


z
y
θ_s
θ_{d_x}
l_s
θ_{a_x}
$d = \sqrt{y^2 + z^2}$
$l_f sin\theta_f + l_t sin(\theta_t + \theta_f)$



$$x = -l_f cos\theta_s - l_t cos(\theta_t + \theta_f)$$
$$y = -l_s cos\theta_s + (l_f sin\theta_f + l_t sin(\theta_t + \theta_f))sin\theta_s$$
$$z = -l_s sin\theta_s - (l_f sin\theta_f + l_t sin(\theta_t + \theta_f))cos\theta_s$$