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(1) Linearização de $f(x) = \cos(x)$

$$f(x) = f(\bar{x}) + \left.\frac{df}{dx}\right|_{x=\bar{x}} (x - \bar{x})$$

A) Com $\bar{x} = 0$

$\cos(x) = \cos 0 + \operatorname{sen} 0 (x - 0) \Rightarrow f(x) \approx 1$

B) Com $\bar{x} = \pi/4$

$\cos(x) = \cos(\pi/4) + \operatorname{sen}(\pi/4)(x - \pi/4) \Rightarrow f(x) \approx \frac{\sqrt{2}}{2} - \left(x - \frac{\pi}{4}\right)\frac{\sqrt{2}}{2}$

(2) Linearização de

$f(x, \Pi, \dot{\Pi}, \mu, F) = F(t) - m\Pi\mu + mx\dot{\Pi} = m\dot{v}$

$f = \bar{F} - m\bar{\Pi}\bar{\mu} + m\bar{x}\bar{\dot{\Pi}} + m\bar{x}(\Pi - \bar{\Pi}) - m\bar{\mu}(\Pi - \bar{\Pi}) + (F - \bar{F}) + m\bar{\Pi}(x - \bar{x})$

Com $\bar{\Pi} = \bar{\dot{\Pi}} = 0$

$\Rightarrow f = F + m\bar{x}\Pi - m\bar{\mu}\Pi$