

\*PME 3380 - Lista do dia 17/09

01)  $f(x) = \cos x$

$$f^*(x) = \cos \bar{x} - \sin \bar{x} \cdot (x - \bar{x}) \longrightarrow \begin{cases} \bar{x} = 0 \rightarrow \cos x = 1 \\ \bar{x} = \frac{\pi}{4} \rightarrow \cos x = \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} \cdot \left(x - \frac{\pi}{4}\right) \end{cases}$$

---

 02)  $m\dot{v} = F - mru + mx\dot{r} \Rightarrow F = m\dot{v} + mru - mx\dot{r} = f(x, u, r, \dot{r}, \dot{v})$

obs.:  $\bar{v} = \bar{r} = \bar{\dot{r}} = 0$

$$f(x, u, r, \dot{r}, \dot{v}) = f(\bar{x}, \bar{u}, \bar{r}, \bar{\dot{r}}, \bar{\dot{v}}) + \frac{\partial f}{\partial x} \bigg|_{\bar{x}, \bar{u}, \bar{r}, \bar{\dot{r}}, \bar{\dot{v}}} (x - \bar{x}) + \frac{\partial f}{\partial u} \bigg|_{\bar{u}, \bar{x}, \bar{r}, \bar{\dot{r}}, \bar{\dot{v}}} (u - \bar{u}) + \frac{\partial f}{\partial r} \bigg|_{\bar{r}, \bar{x}, \bar{u}, \bar{\dot{r}}, \bar{\dot{v}}} (r - \bar{r}) +$$

$$+ \frac{\partial f}{\partial \dot{r}} \bigg|_{\bar{\dot{r}}, \bar{x}, \bar{u}, \bar{r}, \bar{\dot{v}}} (\dot{r} - \bar{\dot{r}}) + \frac{\partial f}{\partial \dot{v}} \bigg|_{\bar{\dot{v}}, \bar{x}, \bar{u}, \bar{r}, \bar{\dot{r}}} (\dot{v} - \bar{\dot{v}})$$

$$f(x, u, r, \dot{r}, \dot{v}) = \underset{0}{m\cancel{\dot{v}}} + \underset{0}{m\cancel{\dot{r}}}\bar{u} - \underset{0}{m\cancel{\dot{r}}}\bar{x} - \underset{0}{m\cancel{\dot{r}}}(x - \bar{x}) + \underset{0}{m\cancel{\dot{r}}}(u - \bar{u}) + \underset{0}{m\bar{u}}(r - \cancel{\bar{r}}) - \underset{0}{m\bar{x}}(\dot{r} - \cancel{\bar{\dot{r}}}) +$$

$$+ m(\dot{v} - \cancel{\bar{\dot{v}}})$$

$$f(x, u, r, \dot{r}, \dot{v}) = m\bar{u}r - m\bar{x}\dot{r} + m\dot{v} \Rightarrow \boxed{m\dot{v} = m\bar{x}\dot{r} - m\bar{u}r + F}$$