Exercícios p/ 01/10:

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

$F(x) = f(\bar{x}) + \dfrac{\partial f}{\partial x}\Big|_{x=\bar{x}} (x - \bar{x})$

$\Rightarrow F(x) = f(\bar{x}) + \dfrac{\partial f}{\partial x}\Big|_{x=\bar{x}} = \cos\bar{x} - \sin\bar{x}\,(x - \bar{x})$

a) $\bar{x} = 0$

$F(x) = \cos 0 - \cancel{\sin 0\,(x-0)}^{0} = 1$

b) $\bar{x} = \pi/4$

$F(x) = \cos \pi/4 - \sin \pi/4\,(x - \pi/4) =$

$= \dfrac{\sqrt{2}}{2} - \dfrac{\sqrt{2}}{2}\,(x - \pi/4)$

2) Com $\dot{v}, \bar{r}$ e $\dot{\bar{r}} = 0$, temos:

$F(x, v, r, \dot{r}, \dot{v}) = mx\dot{r} - mrv - m\dot{v} = -F(t)$

$F(x, v, r, \dot{r}, \dot{v}) = F(\bar{x}, \bar{v}, \bar{r}, \dot{\bar{r}}, \dot{v}) + \dfrac{\partial F}{\partial x}\Big|_{eq}^{0}(x - \bar{x}) + \dfrac{\partial F}{\partial v}\Big|_{eq}^{-10}(v - \bar{v})$

$+ \dfrac{\partial F}{\partial r}\Big|_{eq}(r - \bar{r}) + \dfrac{\partial F}{\partial \dot{r}}\Big|_{eq}(\dot{r} - \dot{\bar{r}}) + \dfrac{\partial F}{\partial \dot{v}}\Big|_{eq}(\dot{v} - \dot{\bar{v}})$

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

$-F(t) = -mvr + m\bar{x}\dot{r} - m\dot{v}$