

3)

a)  $F(x) = x \cdot \sin(x)$

$x \cdot \sin(x) = x$

$x \cdot \sin(x) - x = 0$

$x(\sin(x) - 1) = 0$

①  $\boxed{x=0}$

$F(0) = 0 \cdot \sin(0) = 0$

②  $\sin(x) - 1 = 0$

$\sin(x) = 1$

$\boxed{x = \frac{\pi}{2} + 2K\pi}, K \in \mathbb{Z}$

Pontos fixos:  $x=0$  e  $x = \frac{\pi}{2} + 2K\pi$

Derivada:  $F'(x) = \sin(x) + x \cos(x)$

$|F'(x)| < 1$

①  $\boxed{x=0}$

$F'(0) = \sin(0) + 0 \cdot \cos(0) = 0$

$|F'(0)| = 0 < 1 \quad \checkmark$  converge rápido (PONTO FIXO ATRATOR)  
 $x=0$

②  $x = \frac{\pi}{2} + 2K\pi$

$\sin(x) = 1 \quad \cos(x) = 0$

$F'(x) = 1 + x \cdot 0 = 1 \quad x$  convergência não  
é garantida  
(instável)

b)  $F(x) = x^2 - \frac{x}{2}$

$x^2 - \frac{x}{2} = x$

$x^2 - \frac{x}{2} - x = 0$

$x \left( x - \frac{3}{2} \right) = 0$

①  $\boxed{x=0}$

$F(0) = 0^2 - \frac{0}{2} = 0$

②  $x - \frac{3}{2} = 0 \rightarrow \boxed{x = \frac{3}{2}}$

$F\left(\frac{3}{2}\right) = \left(\frac{3}{2}\right)^2 - \frac{1}{2} \cdot \frac{3}{2} = \frac{3}{2}$

Pontos fixos:  $x=0$  e  $x = \frac{3}{2}$

Derivada:  $F'(x) = 2x - \frac{1}{2}$

$|F'(x)| < 1$

①  $\boxed{x=0}$

$F'(0) = 0 - \frac{1}{2} = -\frac{1}{2}$

$|F'(0)| < 1 \quad \checkmark$  (PONTO FIXO ATRATOR)  
 $x=0$

②  $x = \frac{3}{2}$

$F'\left(\frac{3}{2}\right) = 3 - \frac{1}{2} = 2,5 \quad x$  (PONTO FIXO REPULSOR)

$|F'\left(\frac{3}{2}\right)| > 1$