

1b)  $f(\frac{\pi}{2}, \frac{\pi}{2}) \in$   
 ~~$f(\frac{\pi}{2}, \frac{\pi}{2})$~~

$$|\sin ax_1 - \sin ax_2| < |x_1 - x_2|$$

$$\frac{|\sin ax_1 - \sin ax_2|}{|x_1 - x_2|} < 1 \text{ for all } x_1, x_2$$

$$\therefore |f'(x)| < 1 \text{ for all } x$$

$$\therefore |a \cos ax| < 1 \text{ for all } x$$

$$\therefore |a| < 1 \text{ since } \cos a0 = 1$$

$$\text{or } -1 < a < 1$$