

. Range of the function  $f(x) = \cot^{-1}\{-x\} + \sin^{-1}\{x\} + \cos^{-1}\{x\}$ , where  $\{\cdot\}$  denotes fractional part function

(a)  $\left(\frac{3\pi}{4}, \pi\right)$

(b)  $\left[\frac{3\pi}{4}, \pi\right)$

(c)  $\left[\frac{3\pi}{4}, \pi\right]$

✓ (d)  $\left(\frac{3\pi}{4}, \pi\right]$

$$\sin^{-1}\{x\} + \cos^{-1}\{x\} = \pi/2.$$

$$\text{So, } f(x) = \cot^{-1}\{-x\} + \pi/2.$$

$$\text{Now, } 0 \leq \{ -x \} < 1.$$

$$\Rightarrow \cot^{-1} 1 < \cot^{-1}\{-x\} \leq \cot^{-1} 0$$

$$\Rightarrow \frac{\pi}{4} < \cot^{-1}\{-x\} \leq \frac{\pi}{2}$$

$$\Rightarrow \frac{\pi}{4} + \frac{\pi}{2} < \frac{\pi}{2} + \cot^{-1}\{-x\} \leq \frac{\pi}{2} + \frac{\pi}{2}$$

$$\Rightarrow \boxed{\frac{3\pi}{4} < f(x) \leq \pi}$$

[Note the reversal of inequality  
as  $\cot^{-1}$  is decreasing]