

Quiz 4

Given following function: -

$$f(x) = -\cos(x) - \frac{x}{2}$$

On the interval $[0, 2\pi]$:

1. What interval(s) is the function increasing?
2. What interval(s) is the function decreasing?
3. Where is the function neither increasing nor decreasing?

Solution. Note

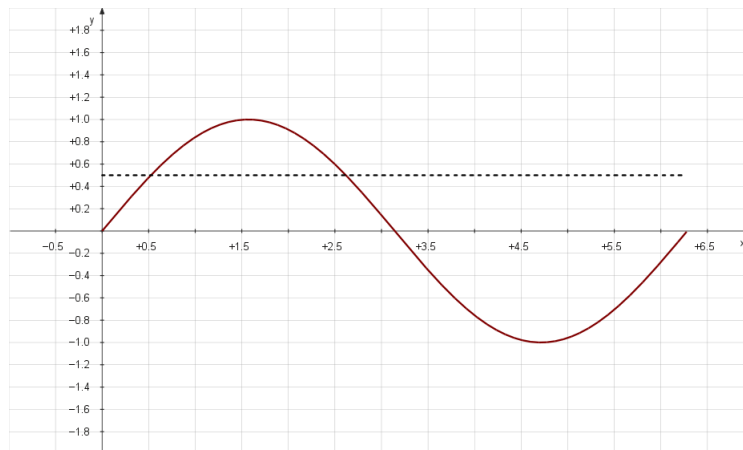
$$f'(x) = \sin(x) - \frac{1}{2}$$

1. When the function is increasing, the derivative will be positive. Thus we need to solve when

$$\sin(x) - \frac{1}{2} > 0$$

ie when

$$\sin(x) > \frac{1}{2}$$



From the picture (and from knowing when $\sin(x) = \frac{1}{2}$) one can see that this is true on the interval $(\frac{\pi}{6}, \frac{5\pi}{6})$.

2. We need to show when the derivative is negative. As you can see, it will be on the intervals $[0, \frac{\pi}{6})$ and $(\frac{5\pi}{6}, 2\pi]$
3. This is when

$$\sin(x) = \frac{1}{2}$$

This happens at $x = \frac{\pi}{6}$ and $x = \frac{5\pi}{6}$.