

Name:

Solutions

MAC 2311 - Analytical Geometry and Calculus I

Quiz # 5, February 13, 2024

(3 points)

Problem 1 .

Calculate the derivatives of

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

$$\begin{aligned} f'(x) &= \frac{2\sin(x)\ln(x) - (-2\cos(x) \cdot \frac{1}{x})}{(\ln(x))^2} \\ &= \frac{2\sin(x)\ln(x) + \frac{2\cos(x)}{x}}{(\ln(x))^2} \end{aligned}$$

A.)

$$\frac{2\ln(x)\sin(x) + \frac{2\cos(x)}{x}}{(\ln(x))^2}$$

B.)

$$\frac{2\ln(x)\cos(x) - \frac{2\sin(x)}{x}}{(\ln(x))^2}$$

C.)

$$\frac{2\ln(x)\sin(x) + \frac{2\cos(x)}{x}}{\ln(x)}$$

D.)

$$\frac{-\frac{2\cos(x)}{x} + 2\ln(x)\sin(x)}{(\ln(x))^2}$$

## Problem 2 .

The position of a particle moving along a straight line is given by

$$s(t) = t + \sin(t) + 2$$

(2 points)

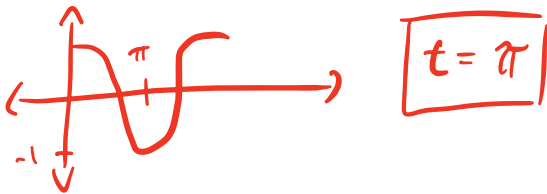
- i) Find the velocity,  $v(t)$ , of the particle at any time  $t$ .

$$v(t) = s'(t) = 1 + \cos(t)$$

(2 points)

- ii) For which  $t$  values on the interval  $[0, 2\pi]$  is the particle at rest?

$$v(t) = 0 \Rightarrow 1 + \cos(t) = 0 \Rightarrow \cos(t) = -1$$



(3 points)

- iii) Find the interval(s) on  $[0, 2\pi]$  for which the velocity is positive. Also find the intervals for which velocity is negative.  $\oplus \downarrow > 0$

$$v(t) > 0 \Rightarrow 1 + \cos(t) > 0 \Rightarrow \cos(t) > -1 \Rightarrow t \in [0, \pi) \cup (\pi, 2\pi]$$

$$v(t) < 0 \Rightarrow 1 + \cos(t) < 0 \Rightarrow \cos(t) < -1, \text{ never}$$

- Velocity is positive on  $[0, \pi) \cup (\pi, 2\pi]$  and never negative on  $[0, 2\pi]$ .