Name: Solutions

MAC 2311 - Analytical Geometry and Calculus I
Quiz # 5, February 13, 2024

(3 points)
Problem 1 .

Calculate the derivatives of

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

$$f'(x) = \frac{2\sin(x)\ln(x) - (-2\cos(x)\cdot\frac{1}{x})}{(\ln(x))^2}$$

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

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

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

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

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

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?

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

$\boxed{t = \pi}$

(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.

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

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

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