

Answer on Question #74858 – Math – Calculus

Question

Find the interval if following function for $f(x) = e^x(2 - 3x - x^3) - 6/e$ is decreasing.

Solution

Domain: $(-\infty, \infty)$.

Find the first derivative with respect to x

$$\begin{aligned} f'(x) &= \left(e^x(2 - 3x - x^3) - \frac{6}{e} \right)' = \\ &= e^x(2 - 3x - x^3) + e^x(2 - 3x - x^3)' = \\ &= e^x(2 - 3x - x^3) + e^x(-3 - 3x^2) = \\ &= e^x(2 - 3x - x^3 - 3 - 3x^2) = \\ &= e^x(-x^3 - 3x^2 - 3x - 1) = \\ &= -e^x(x + 1)^3 \end{aligned}$$

Find the critical point(s)

$$f'(x) = 0 \Rightarrow -e^x(x + 1)^3 = 0$$

$$x = -1$$

If $x < -1$, $f'(x) > 0$, $f(x)$ increases

If $x > -1$, $f'(x) < 0$, $f(x)$ decreases

The function f is decreasing on $(-1, \infty)$.

Answer: $(-1, \infty)$.