

Answer on Question #84833 – Math – Calculus

Question

Find the intervals in \mathbb{R} over which definite integral $(-1$ to $x)$ of $(t+1)^3 \cdot e^t \cdot dt$ is decreasing.

Solution

Let $f(x) = \int_{-1}^x (t+1)^3 e^t dt$. Then $f'(x) = (x+1)^3 e^x$.

In order to find the interval over which the function $f(x)$ decreases, it is necessary to solve the inequality $f'(x) < 0$. That is $(x+1)^3 e^x < 0$.

Since $e^x > 0$ for any x , then $f'(x) < 0$ for $(x+1)^3 < 0$, i.e. for $x < -1$.

Answer: $(-\infty; -1)$ is an interval over which the definite integral $\int_{-1}^x (t+1)^3 e^t dt$ is decreasing.