

PROBLEM

If $f(x) = xe^{x(1-x)}$, then $f(x)$ is (2001S)

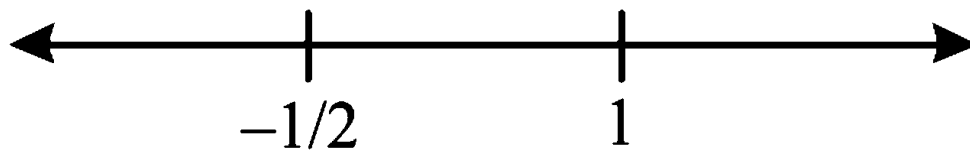
- (a) increasing on $[-1/2, 1]$ (b) decreasing on \mathbb{R}
(c) increasing on \mathbb{R} (d) decreasing on $[-1/2, 1]$

SOLUTION

(a) $f(x) = xe^{x(1-x)}$

$$\begin{aligned} \Rightarrow f'(x) &= e^{x(1-x)} + (1-2x)x e^{x(1-x)} \\ &= -e^{x(1-x)} (2x^2 - x - 1) = -e^{x(1-x)} (2x+1)(x-1) \end{aligned}$$

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$\therefore f(x)$ is increasing on $[-1/2, 1]$