

1. Let $f(x) = xe^x$. Find the critical point(s) and intervals of monotonicity (i.e. intervals where the function is increasing or decreasing) of $f(x)$.

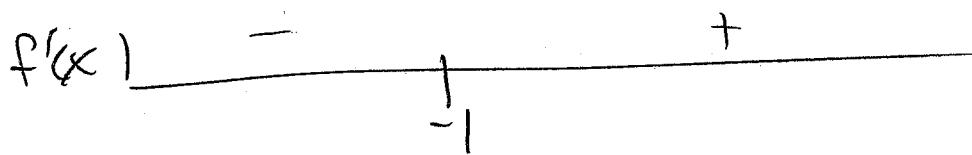
$$f'(x) = xe^x + (1) \cdot e^x = e^x(x+1)$$

$$\text{set } e^x(x+1) = 0 \quad \Rightarrow \quad x+1 = 0$$

$$(\text{Note } e^x > 0 \text{ for all } x)$$

$$\Rightarrow x = -1$$

is our only
critical pt.



$$f'(0) = e^0(0+1) = 1(1) = 1 > 0$$

$$f'(-2) = e^{-2}(-2+1) = (+) \cdot (-) < 0$$

So on $(-\infty, -1)$, $f'(x) < 0$, so $f(x)$ decreasing

on $(-1, \infty)$, $f'(x) > 0$, so $f(x)$ increasing.