

11.5#3

$$b_n = n e^{-n} = \frac{n}{e^n}$$

$$\lim_{n \rightarrow \infty} \frac{n}{e^n} \stackrel{\text{L'H}}{=} \lim_{n \rightarrow \infty} \frac{1}{e^n} = 0$$

$$f = x e^{-x}$$

$$f' = 1 e^{-x} + x (-1) e^{-x} = e^{-x} (1-x)$$

$$\text{for } x > 1 \quad f' < 0$$

so $f(x)$ is decreasing

by AST the series converges.