

(A) $\int_0^{\infty} x e^{-x} dx = M_1$

$\frac{x}{e^x} = \frac{1 \cdot \infty^x}{\infty^x}$

$-e^{-x} \cdot x \Big|_0^{\infty} + \int_0^{\infty} 1 e^{-x} dx$

Hopital

$-e^{-x} \Big|_0^{\infty} = e^{-\infty} - e^{-0} = 0 - 1 = -1$

(B) $\int_0^{\infty} x^2 e^{-x} dx = M_2 = 2$

TIK
TAC
TOE

x^2	e^{-x}	
$2x$	$-e^{-x}$	+
2	e^{-x}	+
0	$-e^{-x}$	+

$-x^2 e^{-x}$
 $-2x e^{-x}$
 $-2e^{-x} \Big|_0^{\infty}$
 $= 2$

④

$$\text{Var}(f) = M_2 - M_1^2$$

$$= 2 - 1^2$$

$$= 1$$

$$\sigma = \sqrt{\text{Var}f} = \boxed{1}$$
