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2l(a) matches

$$\frac{1}{6}k_3\vartheta^3 = \frac{1}{6}m_3\vartheta^3 - \frac{1}{2}m_1m_2\vartheta^3 + \frac{1}{3}m_1^3\vartheta^3$$

$$k_3 = m_3 - 3m_1m_2 + 2m_1^3$$

Conclusion

$k_1(x) = m_1(x)$

$k_2(x) = m_2(x) - m_1(x)^2$

$k_3(x) = m_3(x) - 3m_1(x)m_2(x) + 2m_1(x)^3$

2 l (b)

$$K_{X+Y}(\vartheta) = \sum_{n=1}^{\infty} \frac{1}{n!} k_n(X+Y)\,\vartheta^n$$

// IF indep

$$\log\left[E(e^{\vartheta X})E(e^{\vartheta Y})\right]$$

//

$$k_X(\vartheta) + k_Y(\vartheta) = \sum_{n=1}^{\infty} \frac{1}{n!} k_n(X)\vartheta^n + \sum_{m}^{\infty} \frac{1}{m!} k_m(Y)\,\vartheta^m$$

//

$$\sum_{n=1}^{\infty} \frac{1}{n!} k_n(X+Y)\,\vartheta^n$$

hence claim is true