58. Losses from 3 cities: J, K, L

losses from each of the cities: X_J, X_K, X_L

Combined losses = $X = X_J + X_K + X_L$ * losses are independent

$M_J(t) = (1-2t)^{-3}$

$M_K(t) = (1-2t)^{-2.5}$

$M_L(t) = (1-2t)^{-4.5}$

→ want $E(X^3)$

$E(X^n) = M_X^{(n)}(0)$ → want $M_X(t)$ and then take 3rd derivative and solve at $t=0$

$M_X(t) = E(e^{Xt})$

$E(e^{t(X_J + X_K + X_L)})$

$E(e^{tX_J} e^{tX_K} e^{tX_L})$

$E(e^{tX_J}) E(e^{tX_K}) E(e^{tX_L})$

$= M_J(t) \cdot M_K(t) \cdot M_L(t)$

$M_X(t) = (1-2t)^{-3} (1-2t)^{-2.5} (1-2t)^{-4.5}$

$= (1-2t)^{-10}$

$M_X'(t) = -10(1-2t)^{-11}(-2) = 20(1-2t)^{-11}$

$M_X''(t) = -220(1-2t)^{-12}(-2) = 440(1-2t)^{-12}$

$M_X'''(t) = -5280(1-2t)^{-13}(-2) = 10,560(1-2t)^{-13}$

$M_X'''(0) = 10,560(1-2(0))^{-13}$

$= 10,560 = \underline{E}$