



3. Let  $X$  be a discrete random variable with mgf  $M_X(t)$ , and let  $Y = aX + b$ . Write the definition of  $M_Y(t)$ . Replace  $Y$  with  $aX + b$  and simplify the expected value to show that  $M_Y(t) = e^{tb}M(at)$ .

4. Let  $X$  represent the number of insurance policies sold by an agent in a day. The moment generating function of  $X$  is

$$M_X(t) = 0.45e^t + 0.35e^{2t} + 0.15e^{3t} + 0.05e^{4t}, \quad \text{for } -\infty < t < \infty.$$

Calculate the standard deviation of  $X$ .\*

5. What do you think is the distribution of the random variable  $X$  in problem 4?

★ **BONUS:** Let  $Y = aX + b$ . Differentiate both sides of  $M_Y(t) = e^{tb}M(at)$  to show that  $E(Y) = aE(X) + b$ . Differentiate again to show that  $\text{Var}(Y) = a^2\text{Var}(X)$ .

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\*Actuary Exam P practice problem