

This homework is a review of expectation, variance and moment generating functions and will help make the text's notation familiar. You may discuss problems with classmates but do your own work. You may use examples from this and other texts. I need to be able to follow your work. See Chapter 10 for the formula for the pmf or pdf. Also see pp. 3-4 of Exam 1 review at (<http://parker.ad.siu.edu/Olive/sirev1.pdf>).

Numbers in parentheses such as (1.1) refer to the problem in the text. **Six problems for homework 1.**

1 (1.1). For the Binomial(k, ρ) distribution,

- a) Find $E(Y)$.
- b) Find $\text{Var}(Y)$.
- c) Find the mgf $m_Y(t)$.

(Hints: $Y = Y_1 + \dots + Y_k$ where the Y_i are iid with $P(Y_i = 1) = \rho$ and $P(Y_i = 0) = 1 - \rho$. So $m_Y(t) = \prod_{i=1}^k E[e^{tY_i}]$.)

2 (1.2). For the Poisson(θ) distribution,

- a) Find $E(Y)$.
- b) Find $\text{Var}(Y)$. (Hint: use the kernel method to find $E Y(Y - 1)$.)
- c) Find the mgf $m_Y(t)$.

3 (1.3). For the Gamma(ν, λ) distribution,

- a) Find $E(Y)$. (Hint: use the kernel method and $\Gamma(x + 1) = x\Gamma(x)$ for $x > 0$.)
- b) Find $\text{Var}(Y)$. (Hint: use the kernel method to find $E(Y^2)$.)
- c) Find the mgf $m_Y(t)$. (Hint: see Example 1.10.)

4 (1.4). For the Normal(μ, σ^2) (or Gaussian) distribution,

- a) Find the mgf $m_Y(t)$. (Hint: complete the square to get a Gaussian kernel.)
- b) Use the mgf to find $E(Y)$.
- c) Use the mgf to find $\text{Var}(Y)$.

5 (1.5). For the Uniform(θ_1, θ_2) distribution,

- a) Find $E(Y)$.
- b) Find $\text{Var}(Y)$.
- c) Find the mgf $m_Y(t)$.

6 (1.6). For the Beta(δ, ν) distribution,

- a) Find $E(Y)$.
- b) Find $\text{Var}(Y)$. (Hint: use the kernel method to find $E(Y^2)$.)