1. [15] Given a binary communication channel where A is the input and B is the output, let \( P(A=1) = 0.4 \) and probability of correct transmission 0.8. Compute the following probabilities:
   a) What is the probability that 1 was sent given a 1 is received?
   b) What is the probability that 1 was sent given a 0 is received?
   c) What is the probability that 0 was sent given a 0 is received?

2. [14] 4.9 from Ziemer and Tranter.

3. [16] 4.10 from Ziemer and Tranter.


5. [15] Assuming that \( X \) is a random variable with mean 3 and variance 4, and \( Y \) is a random variable with mean \(-1\) and variance 2, and \( X \) and \( Y \) are independent, determine the following:
   a) Let \( Z = X - Y \). Compute the mean and the variance of \( Z \).
   b) Let \( W = 2X + 3Y \). Compute the mean and the variance of \( W \).
   c) Compute the covariance of \( Z \) and \( W \).

6. [15] If \( X \) is a Gaussian random variable with mean 4 and variance 9, determine the following probabilities:
   a) \( P(X > 7) \)
   b) \( P(0 < X < 9) \)
   c) \( P(X < 4) \)