

Problem Set 4

Fall 2014

Issued: Thursday, September 25, 2014

Due: Thursday, October 2, 2014

Problem 1. Midterm 1.

Problem 2. Consider random variable Z with transform

$$M_Z(s) = \frac{a - 3s}{s^2 - 6s + 8}.$$

- (a) Find the numerical value for the parameter a .
- (b) Find $P(Z \geq 0.5)$.
- (c) Find $E[Z]$ by using the probability distribution of Z .
- (d) Find $E[Z]$ by using the transform of Z and without explicitly using the probability distribution of Z .
- (e) Find $\text{var}(Z)$ by using the probability distribution of Z .
- (f) Find $\text{var}(Z)$ by using the transform of Z and without explicitly using the probability distribution of Z .

Problem 3. Let X and Y be two independent standard normal random variables, $N(0,1)$. Let $W = X^2 + Y^2$ and $Z = X/Y$. Find the marginal distributions of Z and W , and show that they are independent.

Mini-Lab. Download [Lab4 - Multimedia Part II.ipynb](#) from course websites. Complete the mini-lab by filling missing code blocks, and working on problems. Submit your ipynb file and pdf file online.