

HOMEWORK ASSIGNMENT 6

Reading: Text, Section 3.3 and Handout #9

Due Date: March 13, 2003 (in class)

1. Problem 4.18 on page 205 of the text. (Hint: First find the cdfs of Y and Z .)
2. Use your knowledge of Gaussian and jointly Gaussian pdfs to get the answers to the following directly (without resorting to integration).
 - (a) Find the variance of the random variable which has density

$$f_X(x) = \frac{1}{\sqrt{4\pi}} e^{-\frac{(x-3)^2}{4}}, \text{ for all } x.$$

- (b) Suppose $f_{X,Y}(x,y) = \frac{1}{2\pi\lambda^2} e^{-\frac{x^2+y^2}{2\lambda^2}}$. Find $E[X^2 + Y^2]$.

3. Problem 4.27 on page 207 of the text.
4. Problem 4.30 on page 207 of the text.
5. Suppose X is a random variable that is uniformly distributed on the interval $[0, 1]$, that is $f_X(x)$ is 1 on the interval $[0, 1]$ and 0 otherwise.
 - (a) Suppose $Y = e^{-2X}$. Find $F_Y(y)$ and $f_Y(y)$.
Hint: begin with $F_Y(y) = P(Y \leq y) = P(e^{-2X} \leq y) = P(X \geq -(\log y)/2)$.
 - (b) Now suppose that a random process (which is only defined for $t > 0$) is given by $Y(t) = e^{-tX}$. Find the cdf and pdf of the random variable $Y(t_0)$, where t_0 is a fixed positive number.