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Unit overview

Lec. 11: Derived distributions
Exercises 11 due Mar 30, 2016 at 23:59 UTC

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Exercise: Linear functions of continuous r.v.'s

(2/2 points)
(a) Let X be an exponential random variable and let $Y = aX + b$. The random variable Y is exponential if and only if (choose one of the following statements):

- always.
- $a \neq 0$.
- $a \neq 0$ and $b = 0$
- $a > 0$
- $a > 0$ and $b = 0$ ✔
- $a = 1$

(b) Let X be a continuous random variable, uniformly distributed on some interval, and let $Y = aX + b$. The random variable Y will be a continuous random variable with a uniform distribution if and only if (choose one of the following statements):

- always.
- $a > 0$.
- $a \neq 0$ ✔
- $a \neq 0$ and $b = 0$

Lec. 12: Sums of independent r.v.'s; Covariance and correlation
Exercises 12 due Mar 30, 2016 at 23:59 UTC

Lec. 13: Conditional expectation and variance revisited; Sum of a random number of independent r.v.'s
Exercises 13 due Mar 30, 2016 at 23:59 UTC

Solved problems

Additional theoretical material

Problem Set 6
Problem Set 6 due Mar 30, 2016 at 23:59 UTC

Unit summary

Answer:
(a) For Y to be exponential, its range must be $[0, \infty)$. This will be the case only if $a > 0$ and $b = 0$. And if indeed $a > 0$ and $b = 0$, and X has parameter λ, then, for $y \geq 0$,
$f_Y(y) = (1/a)f_X(y/a) = (\lambda/a)e^{-\lambda y/a}$, which is exponential (with parameter λ/a).

(b) A scaled and shifted uniform is uniform, except that if $a = 0$, then Y is a constant random variable, and therefore no longer continuous.

You have used 2 of 2 submissions