Expectations

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Exercise 1. *Compute the expectation of a random normal $\mathcal{N}(\mu, \sigma^2)$.*

Exercise 2. *Compute the expectation and the variance of a uniform distribution in the interval [0,2].*

Exercise 3. *Let X be a random variable with mean μ and variance σ^2. Compute*

1. *$E(2X-3)$ and $V(2X-3)$.*
2. *$V(5-X)$.*
3. *$E((X-2)(X+1))$.*

Exercise 4. *If X is a Poisson random variable of parameter λ, show that*

1. *$E(X) = \lambda$.*
2. *$E(X(X-1)) = \lambda^2$.*

! *Compute $E(X^2)$ and $E((X-E(X))^2)$*

Exercise 5. *Compute the expectation of a continuous random variable X with distribution:*

1. *$f(x) = 6x(1-x)$ in $[0,1]$-*
2. *$f(x) = \frac{3}{x^4}$ if $x > 1$.*
3. *$f(x)$ if it's proportional to x^2 whenever $0 < x < 1$ and zero otherwise.*

Exercise 6. *Compute the expectation of a discrete random variables such that $P(X=1) = \frac{1}{4}$, $P(X=2) = \frac{1}{2}$ and $P(X=1000) = \frac{1}{4}$.*

Exercise 7. *Compute the expectation and the variance of a random variable with distribution $f(x) = \lambda^2 x e^{-\lambda x}$ for $x > 0$.*

Exercise 8. ***!*** *Let X be a random variable with uniform distribution in $[0,1]$. Compute $E(e^{5X})$. Can you find $E(1/X)$?*

Exercise 9. *Let X and Y be two independent random variables such that $E(X) = 2$ $E(X^2) = 6$, $E(Y^2) = 13$ and $E(Y = 3)$. Compute*

- *$E(X^2 - 3X + 2)$, $E((X+1)^2)$, $E((X - E(X))^2)$ and $E(X^2) - E(X)^2$.*
- *$E(X + Y)$, $E(2XY)$, $E((3X - Y)^2)$, $E(3X - Y)^2$ and $E(X \mid Y = 2 =)$.*