Help

6.00.2x Lab: Understanding Probability Distributions

In this lab, we will look at a few sample probability distributions and try to gain an intuitive understanding of their parameters.

1) Describe your probability density function (PDF)

You can see the resulting PDF from the graph.
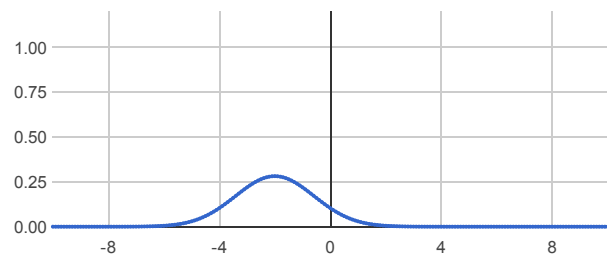
Distribution type:

◉ Gaussian
○ Exponential
○ Uniform

**Mean: -2**

Variance: 2

Selected PDF

2) See the results

You can see samples drawn from the PDF here. We are plotting them in 2D with X and Y values drawn independently from the PDF you described above, because it's more fun that way.

Go ahead and play with the parameters of your PDF; you will see that both plots automatically update. Use this to gain an intuitive understanding of what properties are affected by the parameters.

QUESTIONS   (3/3 points)
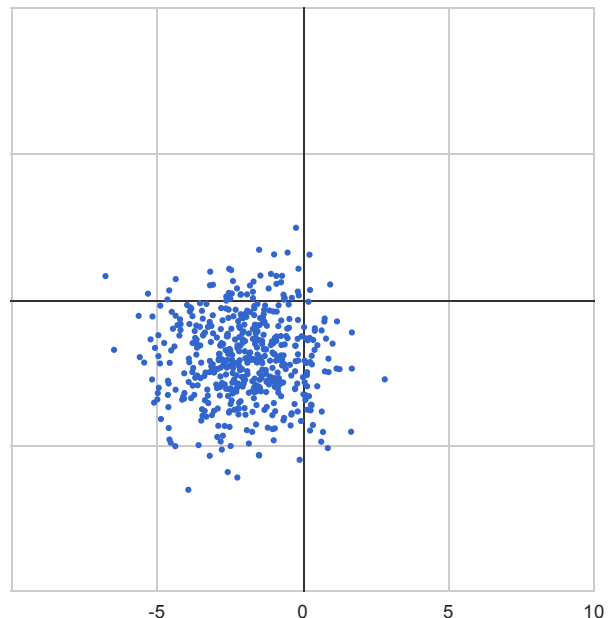
Which of the following points has the highest PDF value? Hint: You can hover over the graph in the lab to see exact values of the PDF in any point.

- ⦿ x = 6 in a uniform distribution with lower bound 4 and upper bound 8 ✔
- ○ x = 2 in a Gaussian distribution with mean = 0 and variance = 2
- ○ x = -3 in an exponential distribution with lambda = 2
- ○ x = 2 in a Gaussian distribution with mean = -2 and variance = 2

EXPLANATION

Exponential distributions are always zero over negative values, so that option can be eliminated quickly. The Gaussian distributions have the same variance but option 4's mean is farther than option 2's, so option 4 can be eliminated too. For the other two options, you can calculate the values from their analytical expressions or simply use the PDF graph tool above.

In an exponential distribution, what happens to the variance if lambda is increased?

- ○ Increases
- ⦿ Decreases ✔
- ○ Stays the same

EXPLANATION

Lambda directly affects the decay rate of the PDF of the exponential distribution. A larger lambda means quicker decay (not a high probability of large values), so variance is lower in that case.

Which probability distributions are constant over some range of x? Check all that apply.

- ☐ Gaussian
- ☑ Exponential ✔
- ☑ Uniform ✔

EXPLANATION

The Gaussian distribution is always nonzero and never constant over any range of x. (You can verify this from the graph.) The exponential function is constant and zero over negative values of x, and the uniform distribution is piecewise constant over all values of x.

Check   Hide Answer

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