Section 9.1: Continuous Random Variables

Thursday, April 2, 2020 12:58 PM

recall: discrete random variables

↳ can only take on certain values

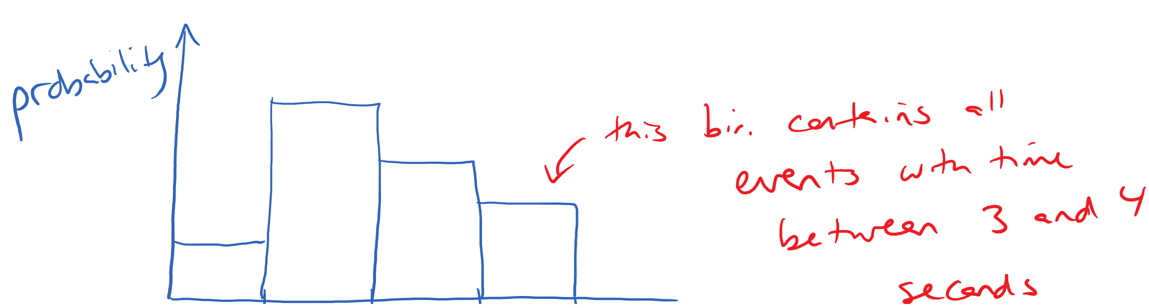
now: continuous random variables

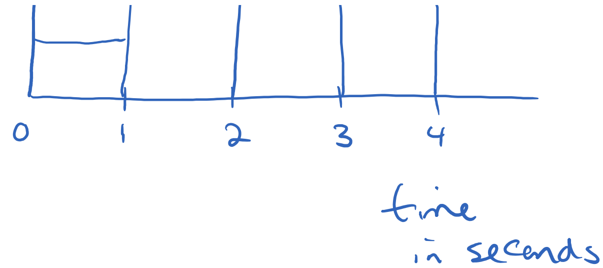
↳ can take on an infinite number of values and can always split the difference between any two values

example: if your variable is time and you have measured the values 2.78 seconds and 2.79 seconds, you could in theory also measure a value of 2.785 seconds

but what does a probability distribution look like if you have an infinite number of values that your variable could take?

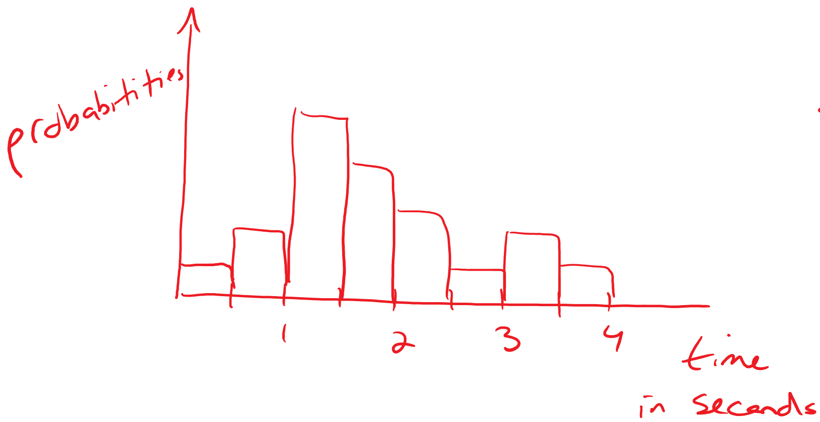
- you could group the data into "bins" and make a histogram:





between 3 and [illegible] seconds

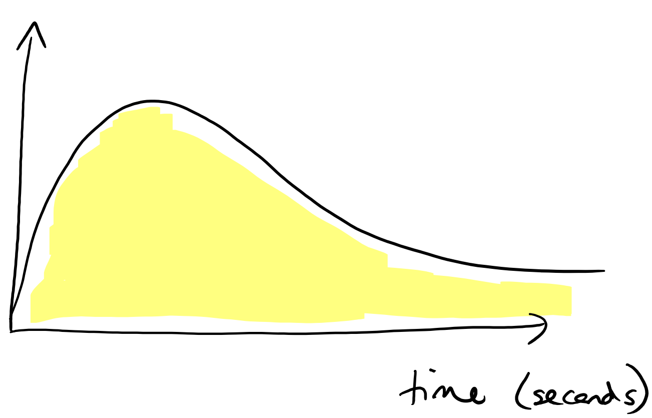
or



smaller bins

or

and eventually, the rectangles will get so small that you can't even see them and you will get a smooth continuous curve.



time (seconds)

this smooth curve is called a <u>density</u> curve

properties of density curves:

1. it is always on or above the x-axis (y-value is never negative)

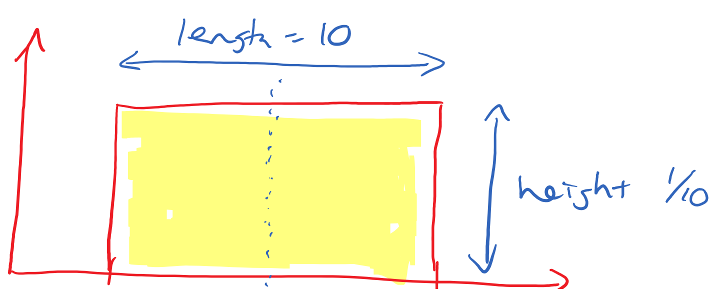
2. the y-axis isn't probability anymore

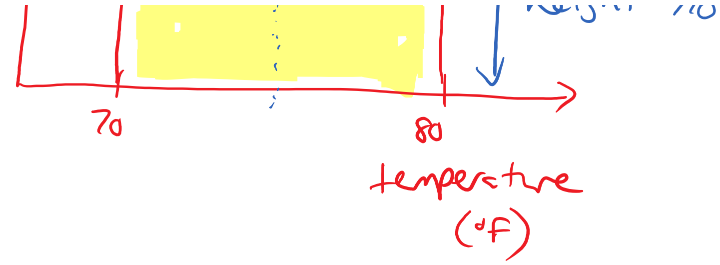
   rather, the scale on the y-axis is chosen such that the <u>area</u> underneath the curve is exactly equal to one (100%)

example: the continuous uniform probability distribution

In March in Pasadena, CA, the temperature during the day is always between 70°F and 80°F with an equal probability of any temperature within that range.

a) what does the density curve look like?

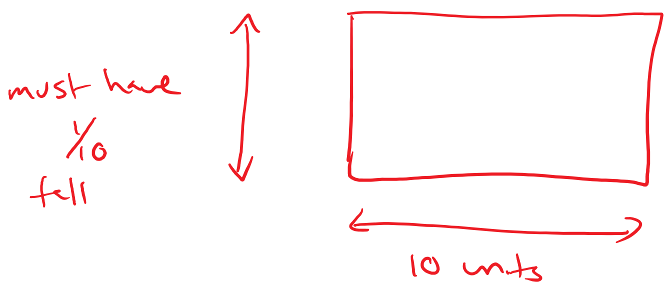




b) what is the average temperature?

by symmetry, the mean temp is 75°F

c) what is the height of the rectangle?



area is equal to 1

area = lw