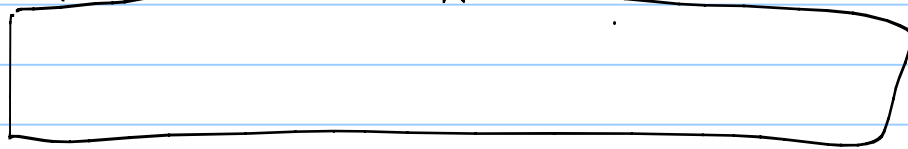


① To make sure the sum is 1, we need

② Note that

The curve $f_x(x)$ is termed the



$$\text{Ex: } f_x(x) = \begin{cases} 2e^{-2x} & \text{if } x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Q: Is $f_x(x)$ a valid pdf (describing a valid W.A.?)

Ans:

Q: Do we need to have $f_x(x) \leq 1$ for all x ?

Ans:

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Example: Today's temperature is uniformly/
equally likely distributed between
(5 F, 40 F)

What is the prob that $P(T > 32)$?

Ans: Step 1: Find the

Step 2: Construct the W.A. Since it is
a continuous random variable. We need
to specify a curve $f_X(x)$.

*.° Uniformly / equally likely.

Step 3: Count the prob of the desired
event.

Example: Temperature is between 5 & 40.
Suppose the prob that it is
between (10, 25) is "twice" as
likely as it is between (5, 10) or (25, 40)

Find $P(T > 32)$

Ans: Step 1: the sample space

Step 2:

Step 3: Count the weight

HW2 Q13:

Q For any valid W.A. show that

$$P(-\infty < X \leq r) \leq P(-\infty < X \leq s)$$

if $r \leq s$

Ans:

Q: Suppose

$$P(-\infty < X \leq r) = P_r$$

$$P(-\infty < X \leq s) = P_s$$

What is $P(r < X \leq s)$?

Ans:

Example: A continuous R.V.

has sample space $\mathcal{S} = [0, \infty)$ (all positive real numbers)

and the prob density function is

$$f_x(x) = \begin{cases} 3e^{-3x} & \text{if } x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Q: What is the prob $X > 32$

Ans:

Conditional prob

(Or the "Relative Frequency")

Example: Two teams play a game.

↳ the weather can be sunny/
rainy.

Q: Sample space?

A:

Q: Construct a valid W.A.?

Ans:

Q: $P(A \text{ wins}) = ?$

Q: What is the prob that A wins
conditioned on that it rains?

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From the W.A perspective, it is
equivalent to &

$$\frac{1}{4}$$

—

Mathematically

Example: Consider an unfair six-faced die X
such that $P(X=k)$ is proportional to
 k . ($P(X=2)$ is twice $P(X=1)$)

Q1: What is the conditional prob
 $P(X \geq 3 \mid X \text{ is a prime})$

Ans: Step 1: Sample space

Step 2: The W.A.

Ans to Q1:

Q2: What is the conditional prob
 $P(X \text{ is a prime} | X \geq 3)$

Ans to Q2:

Or by formula