TOPIC: INTRO TO CONTINUOUS RANDOM VARIABLES

Uniform Distribution

◆ Recall: Discrete R.V. *cannot* be broken down further. Continuous R.V. *can* be broken down further.

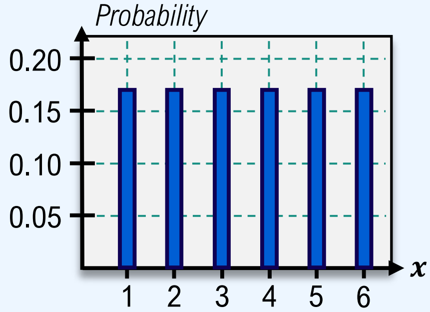
► To find probabilities for CRV's, calculate the ______ under the **probability density fcn**. $P(X = specific\ \#) =$ __.

EXAMPLE Use the graphs below to find $(\boldsymbol{A})\ P(1 \leq X \leq 3)$ & $(\boldsymbol{B})\ P(X = 5)$.

Recall **Discrete Probability**

Ex: Rolling a die, # of items sold

Die Rolls	
X	$P(X)$
1	1/6
2	1/6
3	1/6
4	1/6
5	1/6
6	1/6



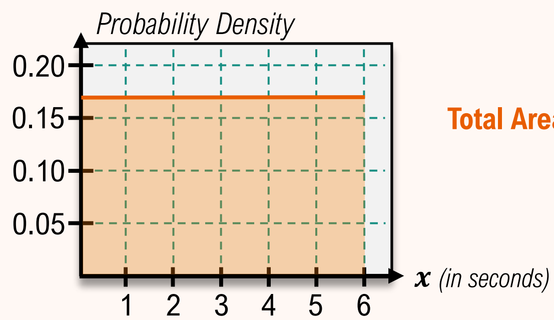
$(\boldsymbol{A})\quad P(1 \leq X \leq 3)$ **(Sum Probabilities)**

$$= P(X = 1) + P(X = 2) + P(X = 3) = \frac{3}{6} = \frac{1}{2}$$

$(\boldsymbol{B})\quad P(X = 5) = \frac{1}{6}$

New **Continuous Probability Density**

Ex: Time, distance



Total Area = ___

$(\boldsymbol{A})\quad P(1 \leq X \leq 3)$ **(Area Under PDF)**

$Area = height \times width$

$(\boldsymbol{B})\quad P(X = 5) =$ __

◆ The **Uniform Distribution** has the ____________ probability density for *every* value of X.

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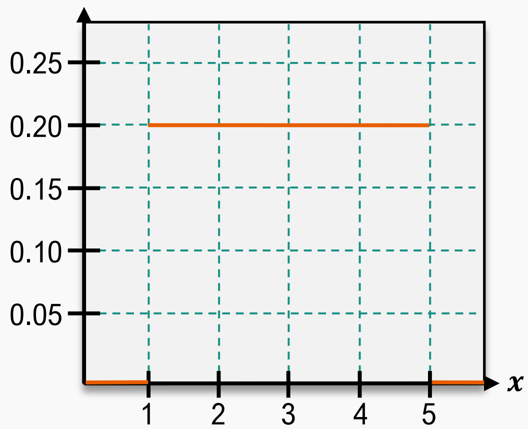
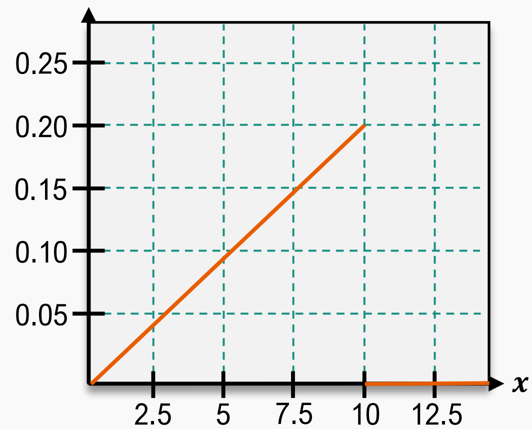
PRACTICE Determine if each curve (in orange) is a valid **probability density function** (i.e. if the total area under the function = 1).

(A)

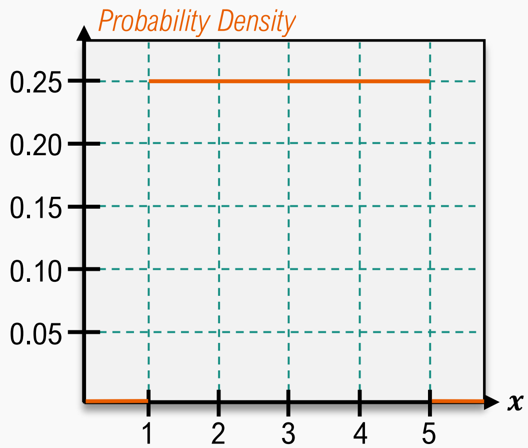


(B)

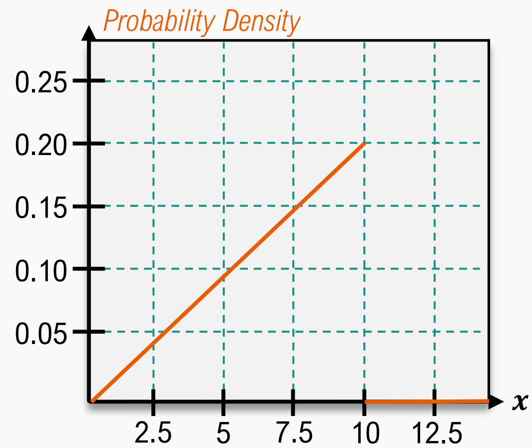


PRACTICE Shade the area corresponding to the probability listed, then find the probability.

(A) $P(2 < X < 4)$



(B) $P(X < 7.5)$



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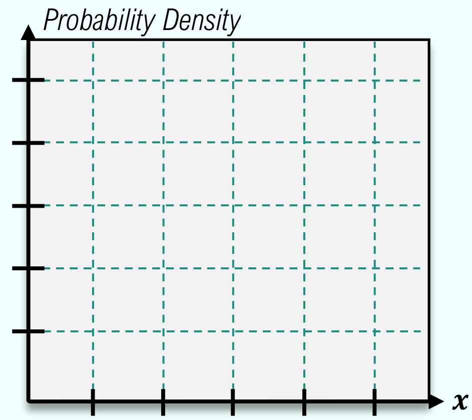
EXAMPLE

A local call center tracks the response time for customer service agents to answer incoming calls during peak hours. Data shows that the time it takes an agent to answer a call is uniformly distributed between 2 seconds and 12 seconds.

(A) Sketch the probability density function for:

X = response time (in seconds) to answer a call.



(B) Find the probability that a call is answered in 5-9 seconds.

PRACTICE

A regional sales manager is forecasting sales for a new energy-efficient refrigerator. Based on market research she estimates that weekly sales will be uniformly distributed between 400 and 700 units. The company's operations team must decide how many units to stock per week to meet demand without overstocking. If they stock 550 units, find the probability of overstocking. If they want to have less than a 20% chance of overstocking, should they stock more or less than 550 units?