<u>TOPIC: INTRO TO CONTINUOUS RANDOM VARIABLES</u>

<u>Uniform Distribution</u>

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

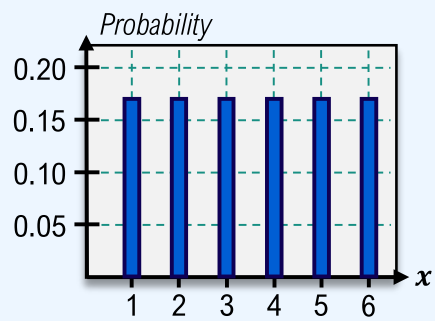
► To find probabilities for CRV's, calculate the ______ under the **probability density fcn**. $P(X = specific\ \#) = \_\_$.

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



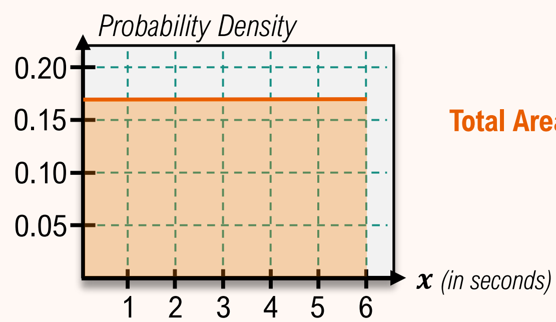
$(\boldsymbol{A})\quad P(1 \leq X \leq 3)$ **(Sum Probabilities)**

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

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

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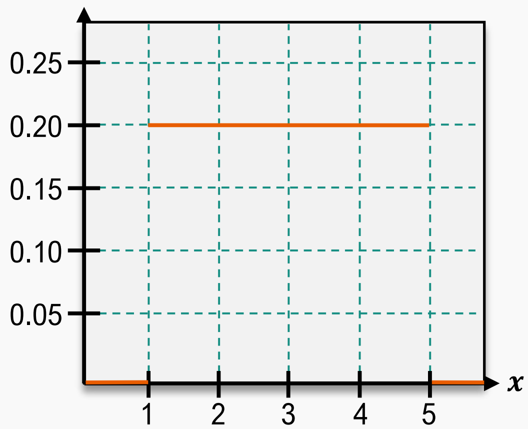
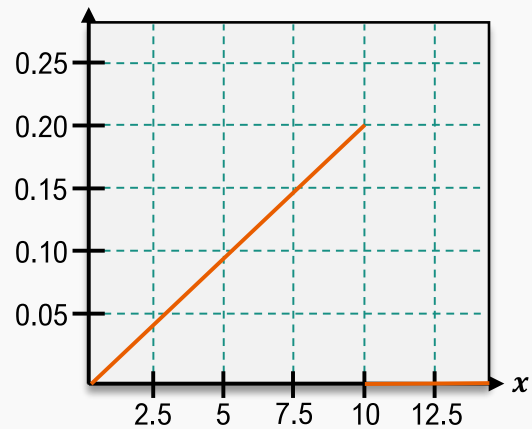
PRACTICE Determine if each curve (in orange) is a valid **probability density function** (i.e. if the total area under the function = 1).

(A)



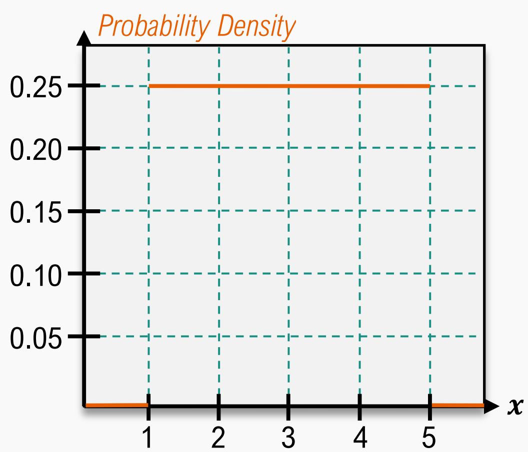
(B)



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

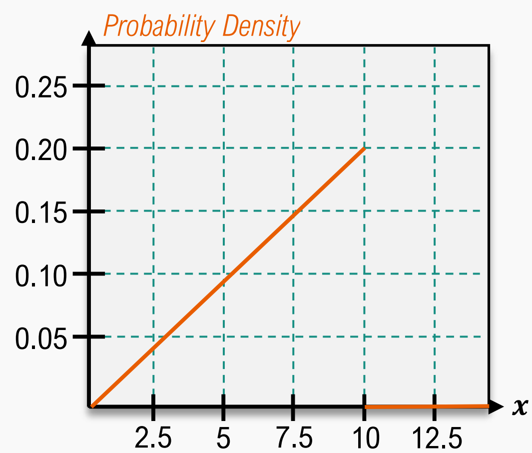
(A)

$P(2 < X < 4)$



(B)

$P(X < 7.5)$



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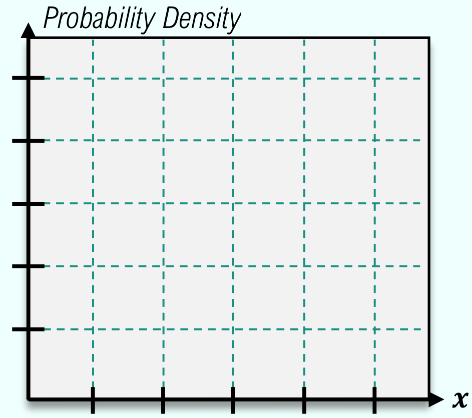
EXAMPLE

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.

$(\boldsymbol{A})$ Sketch the probability density function for:

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



$(\boldsymbol{B})$ Find the probability that a call is answered in 5-9 seconds.

PRACTICE

A commuter train arrives at a station once every 30 minutes. If a passenger arrives at the station at a random time, what is the probability that the passenger will wait less than 10 minutes?