- Daily Openers
- Go over and collect homework

12.1 Probability Distributions

frequency table – a list of outcomes in a sample space & the # of times each occurs.

- Look at Example 1 from page 648

cumulative probability – probability over a continuous range of events.

- Look at Example 2 from page 649

probability distribution – a function that gives the probability of each event in a sample space.

Ex. Example 3 from page 649
Show the probability distribution for the sum of a pair of dice.

Worksheet 12.1 OR if absent do

Homework - ~~Worksheet 12~~.1 p. 651-653(1-14,16,21-23)

Daily Openers - 1. Factor: $3x^2 + 13x - 56$
2. Factor: $6x^2 + 29x + 20$
3. Write in summation notation and find the sum:
$3,\ -1.5,\ -6,\ldots, n = 12$
4. page 631 #66
5. page 631 #10

Name _____ Class _____ Date _____

Practice 12-1 Probability Distributions

1. Use the frequency table to find each probability.

   a. What is the probability that a person living alone is 45 or older? _____

   b. In a sample of 100 persons living alone, predict how many are age 35 and older. _____

   c. Find P(15 to 24 years of age) _____

   d. Find P(35 to 44 years of age) _____

   e. Find P(65 years and older) _____

Persons Living Alone in 1999 (in thousands)

15 to 24 years of age	1,313
25 to 34 years of age	3,714
35 to 44 years of age	4,074
45 to 64 years of age	7,757
65 years and older	9,747

Source: *www.infoplease.com*

2. You roll two number cubes. Make a table to show the probability distribution for each sample space.

   a. {the sum of the cubes is 5 or less, the sum is greater than 5} _____

   b. {the sum of the cubes is prime, the sum is composite} _____

   c. {only one cube shows 2, both cubes show the same number, the cubes show different numbers and neither is a 2} _____

3. A survey of student pizza preferences showed that 43 students preferred cheese, 56 preferred sausage, 39 preferred pepperoni, 28 preferred supreme, 31 preferred another kind, and 19 did not like any type of pizza.

   a. Organize this data in a frequency table.

   b. Find the experimental probability for each outcome in the table. Round to the nearest tenth of a percent. What is the sum of the experimental probabilities? Explain. _____

   c. Graph the probability distribution for {pizza, no pizza}.

   d. Graph the probability distribution for {cheese, sausage or pepperoni, supreme or other, no pizza}.

   e. How are the probability distributions related? _____

4. Visitors to the game preserve see up to eight species of large mammals as they drive through. A survey shows that the number of species seen varies according to the distribution below.

Probability Distribution for Number of Species Seen

S	0	1	2	3	4	5	6	7	8
$P(s)$	0.08	0.12	0.21	0.18	0.12	0.11	0.09	0.08	0.01

   a. Use random numbers to simulate the number of species seen in each of 20 visits to the preserve. What is the average per visit? _____

   b. You donate \$5 to the preserve for upkeep of each species you see. On the basis of your simulation, how much would you donate in 20 visits? _____

12.1 Probability Distribution (p.648)

You roll a standard cube. Is this a sample space for the outcomes?

1.) {1, 2, 3, 4, 5, 6} Yes

2.) {less than 3, 4, 5, 6} NO

3.) {even, prime} NO {2, 3, 4, 5, 6}

Find each probability for 2 tosses of a # cube.

4.) $P(4 \text{ and } 3) = \frac{1}{36} + \frac{1}{36} = \frac{2}{36} = \frac{1}{18}$

5.) $P(2 \text{ odd \#'s}) = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

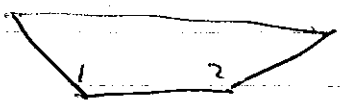
6.) $P(2 \text{ integers}) = 1$

A <u>frequency table</u> is a list of outcomes in a sample space and the # of times each outcome occurs.

less 90° Acute 𝍸 𝍸 |
90° Right 𝍸 ||||
1 ∠ 90° Obtuse 𝍸

total # of Δ's : 25

type	number
Acute	13
Right	7
Obtuse	5
Total	25



$Prob(\text{Right}) = \frac{7}{25}$

Probability over a continuous range of events is cumulative probability. You can use a frequency table to find cumulative probability.

(ex 2) P(once a week or more)

P(1 time per week) + P(less than 1 time per week)

$$\frac{236}{1391} + \frac{199}{1391} = \frac{\quad}{1391}$$

Probability Distribution is a function that gives the probability of each event in a sample space. You can use a table or a graph to show a probability distribution.

(ex 3) Suppose you roll 2 # cubes. Show the probability distribution for the sum of the #'s.

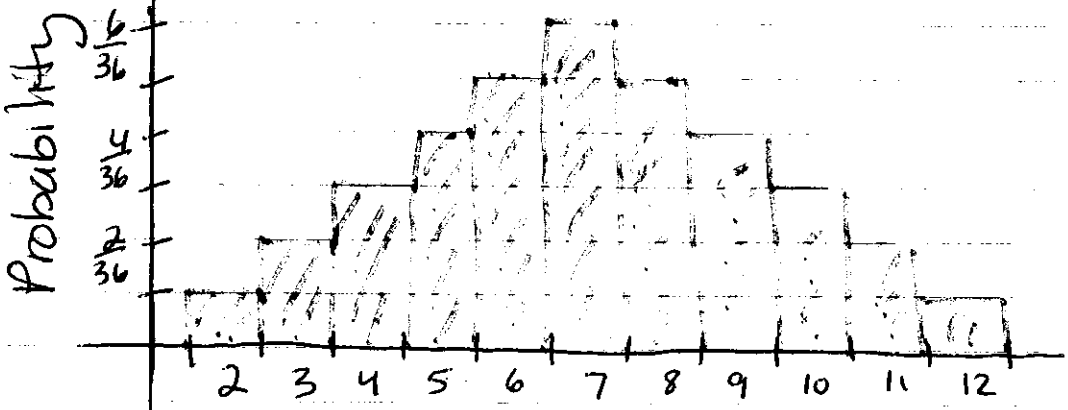
method 1: make a Frequency table

Sum	2	3	4	5	6	7	8	9	10	11	12
Frequency	(1,1) 1	(1,2) (2,1) 2	(1,3) (3,1) (2,2) 3	(1,4) (4,1) (2,3) (3,2) 4						(5,6) (6,5) 2	6,6 1
Probability	$\frac{1}{36}$										

$6 \cdot 6 = 36$ total possible outcomes

↑ 6 outcomes on each die

Method 2: Draw a graph.



A situation may be described by more than one sample space. In that case, each sample space has its own probability distribution

Refer to ex. 4 on p. 650

Quick √4 table for a)

table for b)

Part 2

Using a Probability Distribution you can design a simulation based on a prob distribution.

1st: use the probabilities to assign #'s to each event in the sample space.

ex P(event) = 0.15 p.650

C	0	1	2	3	4	5	6
P(C)	.15	.24	.28	.17	.09	.05	.02

Event	Probability	cumulative Probability	Assigned #'s
0	.15	.15	01 – 15
1	.24	.15 + .24 = .39	16 – 39
2	.28	.39 + .28 = .67	40 – 67
3	.17	.67 + .17 = .84	68 – 84
4	.09	.84 + .09 = .93	85 – 93
5	.05	.93 + .05 = .98	94 – 98
6	.02	.98 + .02 = 1.00	99 – 100

mintes	1	2	3	4	5	6	7	8	9	10
rand#	7	79	59	64	5	62	30	89	77	91
# customers	0	3	2	2	0	2	1	4	3	4

$\frac{21}{10}$ customers $\approx$ 2.1