

Stat 104 – Lecture 14

Probability Distributions

- Random variable
 - Numerical values associated with the outcomes of a random phenomenon.

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Probability Distributions

- Discrete random variable
 - Numerical values associated with a distinct (discrete) set of points on the number line.
 - The probability distribution assigns a probability to each numerical value.

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The Deal - Continued

- Bag o' chips (poker chips).
 - Some are red.
 - Some are white.
 - Some are blue.
- Draw a chip from the bag.

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The Deal - Continued

- Draw a red chip win 3 bonus points.
- Draw a blue chip win 1 bonus points.
- Draw a white chip lose 1 bonus points.

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Discrete Random Variable

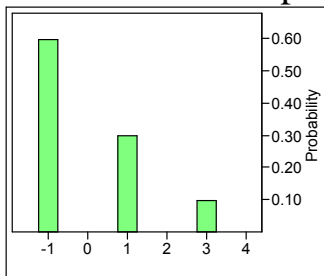
- X = number of bonus points

x	-1	+1	+3
P(x)	0.60	0.30	0.10

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Discrete R.V.

- X = number of bonus points



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Discrete R.V.

- Property 1

$$0 \leq P(x) \leq 1$$

- Property 2

$$\sum P(x) = 1$$

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Mean of a Discrete R.V.

- The “center” of the distribution of values found as a weighted average of the values.

$$\mu = \sum [xP(x)]$$

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Discrete Random Variable

- X = number of bonus points

x	-1	+1	+3	
P(x)	0.60	0.30	0.10	
xP(x)	-0.60	+0.30	+0.30	$\mu = 0$

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Mean of a Discrete R.V.

- X = number of bonus points

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Rake it in!TM

x	P(x)
\$0	1,115,988/1,440,000
\$1	192,000/1,440,000
\$2	72,000/1,440,000
\$3	28,800/1,440,000
\$7	19,200/1,440,000
\$14	7,200/1,440,000
\$31	4,800/1,440,000
\$1,500	12/1,440,000

Rake it in!TM

- If all 1,440,000 tickets are sold and if all prizes are claimed, the Iowa Lottery will payout \$824,400
- Mean payout
 - $\mu = \$824,400/1,440,000 = \0.5725
- This means the Iowa Lottery pays out, on average, under 60 cents for every \$1 ticket sold.

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