Statistics

Lecture 14

Feb 19-8:47 AM

SG 14

Data
- 1) Qualitative
  - Non-Numerical
- 2) Quantitative
  - Numerical
    - 1) Discrete
      - Countable
    - 2) Continuous
      - measureable

Apr 15-9:59 AM

Let x be a discrete random variable with Prob. Dist. $P(x)$.

Prob. Dist. gives us the prob. of all possible outcomes.

1) Table or chart
2) Graph
3) Formula
4) Basic idea of prob.

Apr 15-10:02 AM

Some Rules:

1) $0 \leq P(x) \leq 1$
2) $\sum P(x) = 1$
3) $P(x) = 0 \longleftrightarrow$ Impossible event
4) $P(x) = 1 \longleftrightarrow$ Sure event
5) $0 < P(x) \leq .05 \longleftrightarrow$ Rare event

Apr 15-10:06 AM

x	P(x)
1	.2
2	.5
3	.3

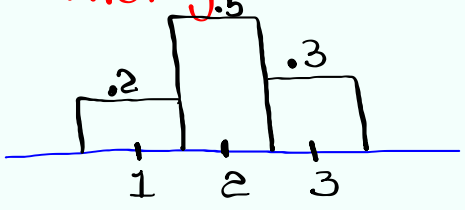
1) Verify $\sum P(x) = 1$

$.2 + .5 + .3 = 1$ ✓

2) $P(x \geq 2) = .5 + .3 = \boxed{.8}$

3) $P(x \leq 2) = .2 + .5 = \boxed{.7}$

4) Draw Prob. dist. histogram



~~x~~ → Midpoint

P(x) → Rel. F.

Apr 15-10:10 AM

Complete the chart below

x	P(x)	xP(x)	$x^2P(x)$
2	.3	.6	1.2
3	.5	1.5	4.5
4	.2	.8	3.2

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

$.3 + .5 + .2 = 1$ ✓

2) $P(x=2 \text{ or } x=4)$

$.3 + .2 = \boxed{.5}$

3) $\sum xP(x) = 2.9$

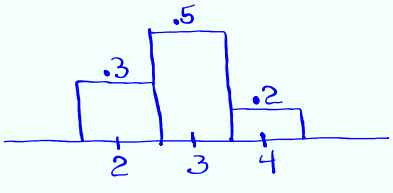
4) $\sum x^2P(x) = 8.9$

5) Compute $\sum x^2P(x) - (\sum xP(x))^2$

$= 8.9 - 2.9^2 = \boxed{.49}$

6) $\sqrt{\text{Last answer}} = \sqrt{.49} = \boxed{.7}$

7) Draw Prob. dist. histogram



Apr 15-10:18 AM

x	P(x)
1	.1
2	.2
3	.4
4	.3

1) $P(x=4) = 1 - [.1 + .2 + .4] = .3$

2) $P(x=1 \text{ or } x=4) = .1 + .3 = .4$

3) $\sum x\,p(x) = 2.9$

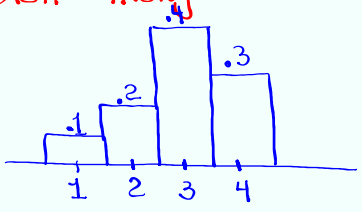
4) $\sum x^2 p(x) = 9.3$

5) Compute $\sum x^2 p(x) - \left(\sum x\,p(x)\right)^2$

$= 9.3 - 2.9^2 = .89$

6) $\sqrt{\text{Last Answer}} = \sqrt{.89} \approx .943$

7) Draw Prob. Dist. Histogram.



Apr 15-10:32 AM

Mean μ (mu) $\quad \mu = \sum x\,p(x)$

Variance σ^2 (Sigma^2) $\quad \sigma^2 = \sum x^2 p(x) - \mu^2$

Standard Deviation σ (Sigma) $\quad \sigma = \sqrt{\sigma^2}$

Apr 15-10:43 AM

x	$P(x)$
3	.3
4	.4
5	.3

$x \rightarrow$ L1

$P(x) \rightarrow$ L2

STAT → CALC

1: 1-Var Stats

List: L1

Freq List: L2

Calculate

$\mu = \bar{x} = 4$

$\sigma = \sigma_x = .775$

$n = 1$ ← Total Prob.

VARS → 5: Statistics → 4: σ_x

χ^2

$\sigma^2 = .6$ $\quad \frac{3}{5}$

Enter $\quad$ .6 $\quad$ Math → 1: ▶Frac → Enter

Apr 15-10:47 AM

x	$P(x)$
1	.05
2	.1
3	.15
4	.2
5	.5

$x \rightarrow$ L1

$P(x) \rightarrow$ L2

Use 1-Var Stats with L1 & L2

$\mu = 4$

$\sigma = 1.225 \approx 1$

$\sigma^2 = 1.5$

68% Range $\quad \mu \pm \sigma = 4 \pm 1 \rightarrow$ 3 to 5

Usual Range $\quad \mu \pm 2\sigma = 4 \pm 2(1) \rightarrow$ 2 to 6

Apr 15-10:55 AM

Expected Value

25 TKts $10 each

Draw 1 TKt

winner gets a calc. worth $100.

Net	P(Net)
10 − 100	1/25
10 − 0	24/25

Net → L1

P(Net) → L2

E.V. = $\mu = \bar{x}$

$\sigma^2 = 384$

$6

Apr 15-11:02 AM

You buy a policy for $100

Any damage to your shipment, you get $1000

Prob. of damage is .1%.

Find E.V. per policy sold.

L1 Net	L2 P(Net)
100 − 1000	.001
100 − 0	.999

E.V. = $\mu = \bar{x}$ = $99

$\sigma^2 = 999$

SG 14 & 15

Apr 15-11:08 AM