Statistics
Summer 2021
Lecture 10

Consider the chart below

x	$P(x)$
1	.1
2	.2
3	.25
4	.3
5	.1
6	.05

1) Find $P(x=6)$

$=1-[.1+.2+.25+.3+.1]=.05$

2) Find $P(x\geq 2)$

$=1-P(x=1)=1-.1=\boxed{.9}$

3) Draw Prob. dist. Histogram

$x \rightarrow L1$

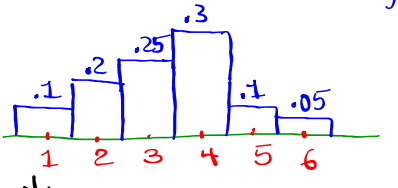
$P(x) \rightarrow L2$

1-Var Stats

$\mu=\bar{x}=3.25$

$\sigma=\sigma_x=1.299$

$n=1$



Find σ^2 in reduced fraction

VARS | 5: Statistics | 4: σ_x | x^2 | Math | 1: | Enter

$\sigma^2=\frac{27}{16}$

68% Range $\mu \pm \sigma$

Usual Range $\mu \pm 2\sigma$

A box has 3 Quarters and 9 Nickels.

Select 2 coins, No replacement.

NN → $P(10¢) = \frac{9}{12} \cdot \frac{8}{11} = \frac{72}{132}$

NQ, QN → $P(30¢) = 2 \cdot \frac{9}{12} \cdot \frac{3}{11} = \frac{54}{132}$

QQ → $P(50¢) = \frac{3}{12} \cdot \frac{2}{11} = \frac{6}{132}$

Total ¢	P(Total ¢)
10	72/132
30	54/132
50	6/132

Total ¢ → L1

P(Total ¢) → L2

1-Var Stats

$\mu = \bar{x} = 20$

$\sigma = \sigma_x = 11.677$

$n = 1$

Find σ^2 in reduced fraction

$\sigma^2 = \frac{1500}{11}$

Consider a binomial Prob. dist with $n = 80$ and $P = .75$.

$q = 1 - P = \boxed{.25}$

$np = 80(.75) = \boxed{60}$

$npq = 80(.75)(.25) = \boxed{15}$

$\sqrt{npq} = \sqrt{15} \approx \boxed{3.873}$

P(exactly 55 successes) $= P(x = 55)$

$= \text{binompdf}(80, .75, 55)$

$= \boxed{.043}$

P(fewer than 65 successes)

$= P(x < 65) = P(x \leq 64) = \text{binomcdf}(80, .75, 64)$

$= \boxed{.879}$

P(at least 55 Successes)

$= P(x \geq 55) = 1 - P(x \leq 54) = 1 - \text{binomcdf}(80, .75, 54)$

Don't want | want

54 | 55

$= \boxed{.920}$

$P(x = a) = \text{binompdf}(n, P, a)$

$P(x \leq a) = \text{binomcdf}(n, P, a)$

$P(x \geq a) = 1 - \text{binomcdf}(n, P, a-1)$

Mean $\mu = np$

Variance $\sigma^2 = npq$

Standard Deviation $\sigma = \sqrt{\sigma^2}$

} Binomial Prob. Dist.

Flip a fair coin 100 times.

Landing tails is a success.

1) $n = 100$ 2) $P = .5$ 3) $q = .5$

4) $\mu = np = 100(.5) = \boxed{50}$

5) $\sigma^2 = npq = 100(.5)(.5) = \boxed{25}$

6) $\sigma = \sqrt{\sigma^2} = \sqrt{25} = \boxed{5}$

7) 68% Range

$\mu \pm \sigma$

$\Rightarrow \boxed{45 \text{ to } 55}$

8) Usual Range

95% Range

$\mu \pm 2\sigma$

$\Rightarrow \boxed{40 \text{ to } 60}$

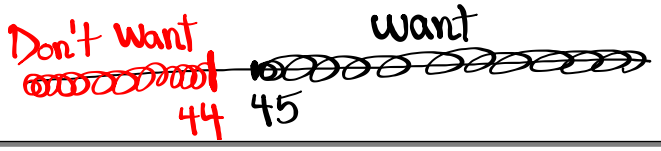
P(Land fewer than 60 tails)

$P(x < 60) = P(x \leq 59)$

$= \text{binomcdf}(100, .5, 59) = \boxed{.972}$

P(Land at least 45 tails)

$P(x \geq 45) = 1 - P(x \leq 44) = 1 - \text{binomcdf}(100, .5, 44)$



$= \boxed{.864}$

$P(a \leq x \leq b) = \text{binomcdf}(n, p, b) - \text{binomcdf}(n, p, a-1)$

Reduce by 1

Consider a binomial Prob. dist with $n = 250$ and $p = .4$

$q = 1 - p = \boxed{.6}$

$\mu = np = 250(.4) = \boxed{100}$

$\sigma^2 = npq = 250(.4)(.6) = \boxed{60}$

$\sigma = \sqrt{\sigma^2} = \sqrt{60} \approx \boxed{7.746}$

P(exactly 50 successes)

$P(x=50) = \text{binompdf}(250, .4, 50)$

$= \boxed{7.3 \times 10^{-12}}$

P(at most 150 successes)

$P(x \le 150) = \text{binomcdf}(250, .4, 150)$

$= .999\ldots \approx \boxed{1}$

P(# of successes is between 90 and 110, inclusive)

$P(90 \le x \le 110) = \text{binomcdf}(250, .4, 110) -$

Reduce by 1: $\text{binomcdf}(250, .4, 89) = \boxed{.825}$

Prob. that any student has iPhone is .8.

400 students were randomly selected.

1) $n = 400$

2) $p = .8$

3) $q = .2$

4) $\mu = np = 320$

5) $\sigma^2 = npq = 64$

6) $\sigma = \sqrt{\sigma^2} = 8$

7) 68% Range

$\mu \pm \sigma$

$\Rightarrow \boxed{312 \text{ to } 328}$

8) 95% Range

usual Range

$\mu \pm 2\sigma \Rightarrow \boxed{304 \text{ to } 336}$

9) P(between 310 and 330 students have iPhone, inclusive)

$P(310 \le x \le 330) = \text{binomcdf}(400, .8, 330) -$

$\text{binomcdf}(400, .8, 309)$

Reduce by 1

$= \boxed{.811}$

Prob. of full recovery from certain surgery is .9.

200 of such surgeries were randomly selected.

1) $n = 200$ 2) $p = .9$ 3) $q = .1$

4) $\mu = np = \boxed{180}$ 5) $\sigma^2 = npq = \boxed{18}$ 6) $\sigma = \sqrt{\sigma^2} = \sqrt{18} \approx 4.243$

7) P(between 175 and 185, inclusive have full recovery)

$= P(175 \le x \le 185) = \text{binomcdf}(200, .9, 185) -$

Reduce by 1 $\text{binomcdf}(200, .9, 174) = \boxed{.807}$

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