Linear Func of Random variables

instead –

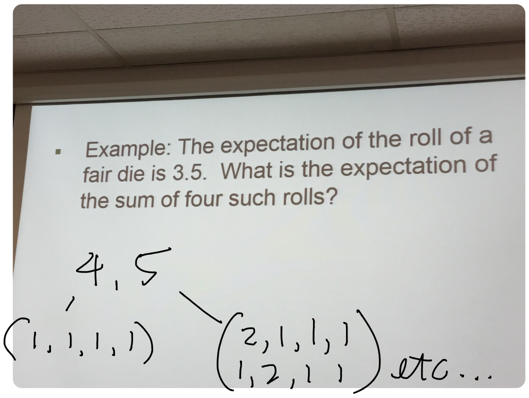
$3.5 = \mu_x$

X_i = value of i^{th} role

$= E(X_1 + X_2 + X_3 + X_4)$

$= 3.5 + 3.5 + 3.5 + 3.5$

$= 14$



4, 5

(1, 1, 1, 1)   (2, 1, 1, 1 / 1, 2, 1, 1) etc...

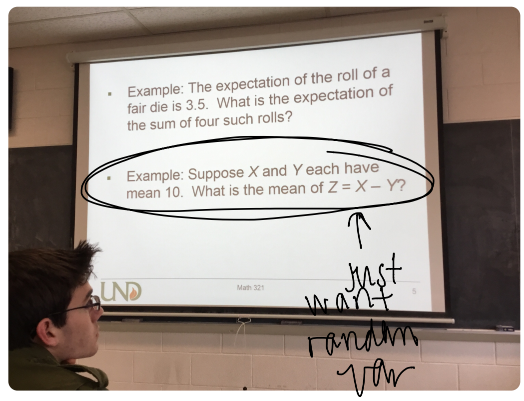
⋮ 24

Independent Random variables

$X: S \to R$

$Y: S' \to R$

if small sample w/ BIG pop, may treat sample as independent even if no replacement



just want random var

if not independent, "don't worry about it"

ex: variance $= 35/12$ of fair die

variance of 4 rolls?

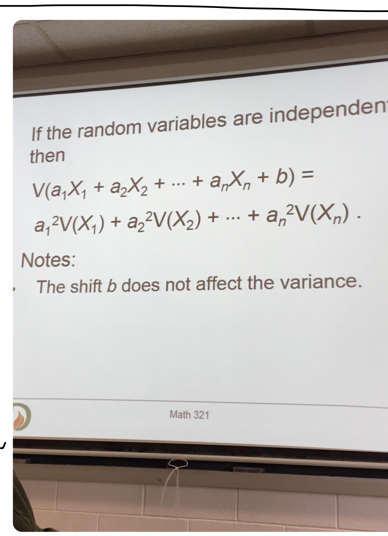
$4(35/12) = \boxed{35/3}$

B) single roll x 4, variance?

not same as above → $V(4X)$

$4^2 V(X)$

↑ need to square according to formula (if you bring value out in front)



mean = 10
var = 4

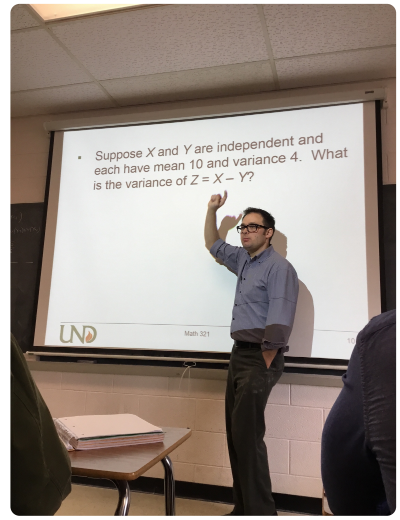
$V(X-Y)$

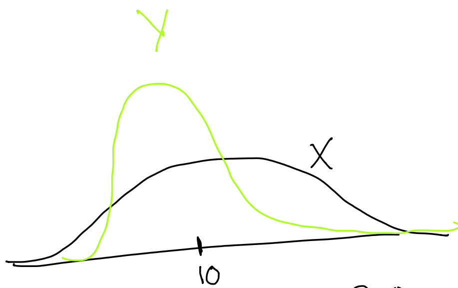
$V(X+(-Y))$

$= V(X) + V(-Y)$

$= V(X) + (-1)^2 V(Y) =$

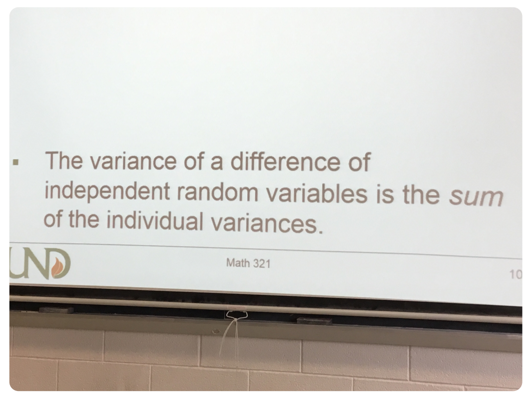
$V(X) + V(Y)$





$X+Y =$ mean $= 20$
possible values? $9+11 = 20$
$11+11 = 22$

$X-Y =$ mean $= 0$ $\quad 9+11 = \pm 2$
$11+11 = 0$



variance of $Z = X - Y$ is <u>not</u> 0

$\bar{X} = \dfrac{X_1 + X_2 + \ldots}{n}$

sample mean is special case
→ can calculate $E(\bar{X})$
if $E(X_i) = \mu$ + $V(X) = \sigma^2$ then

$E(\bar{X}) = \mu$

$V(\bar{X}) = \dfrac{\sigma^2}{n}$ $\qquad \sigma_{\bar{X}} = \dfrac{\sigma}{\sqrt{n}}$