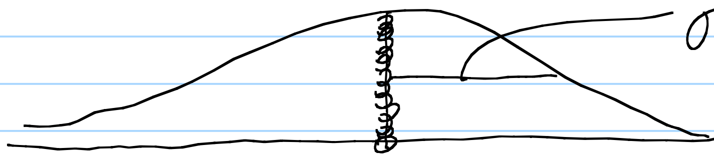
STT 200 SEC. 202 7-19-10

Note Title 7/18/2010

1. DIST OF r.v. X = DENSITY OF A CASTING.

$\sim$ GIVEN



$\sigma = .09$ GIVEN

x

$\mu = 1.77$ GIVEN

% CASTINGS HAVING DENSITY BETWEEN THESE LIMITS $\frac{.68}{2} = .34$

RULE OF THUMB.

$\underline{Ck}$ RULE

z	.00
1.0	$\boxed{0.3413}$

CLOSE TO 34%

RULE 68% IN $\mu \pm \sigma$

95% IN $\mu \pm 2\sigma$

MORE ACCURATELY 1.96

RECALL

b. 68% INTERVAL $\mu \pm \sigma = 1.77 - 0.09 \quad 1.77 + 0.09$

LOW END HIGH END.

PROB? (CASTING DENSITY IN ABOVE) $\approx .68$

c. 95% INTERVAL $\mu \pm 2\sigma \quad 1.77 - 2(0.09) \quad 1.77 + 2(0.09)$

GOOD FOR ROUGH WORK.

d. AREA LEFT OF 1.77

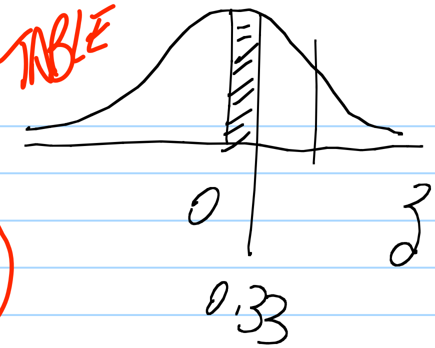
e. STD (z) SCORE

OF CASTING WHOSE DENSITY IS $1.8 = x$.

ANS $\dfrac{x-\mu}{\sigma}$ (# OF σ UNITS THAT x DIFFERS FROM μ)

$= z = (1.8 - 1.77)/0.09 = 0.33$

f. USE TABLE pg 210 TO GET $P(Z \text{ IN } (0, 0.33))$ TABLE



EXACTLY SAME AS $P(X \text{ IN } 1.77 \text{ AND } 1.80)$

$$\frac{1.77-\mu}{\sigma} = \frac{1.77-1.77}{0.09} = 0$$

$$\frac{1.80-1.77}{0.09} = 0.33$$

QUES. IF INSTEAD OF 1.77 WE'D ASKED FOR

$Pr(X \text{ IN } 1.6 \text{ TO } 1.8)$

NEED Z(LOWER) $z = (1.60-1.77)/0.09 = -\frac{.17}{0.09} =$

0.4699

z

SETUP

ADD THESE TWO PIECES.

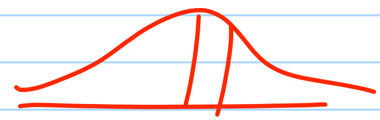
z upper

LOWER

0.4699

z	.08
1.8	0.4699

UPPER



z	.03
0.3	$\boxed{0.1293}$

ANS (TO QUESTION RAISED IN CLASS)

$$P(\text{DENSITY } X \text{ IN } \overset{\text{BELOW } \mu}{1.6} \text{ TO } \overset{\text{ABOVE } \mu}{1.8}) = \overset{\text{SUM OF TWO PARTS}}{0.4699 + 0.1293} = .5992$$

2. POISSON GIVEN μ AND MUST KNOW THAT FOR POISSON

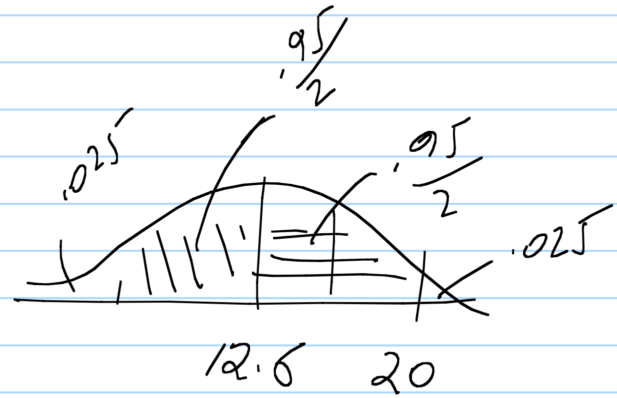
$$\sigma = \sqrt{\mu}$$ YOU KNOW THIS!

GIVEN $\mu = 12.6 \geq 10$

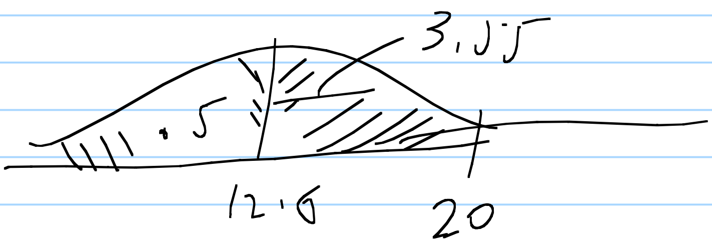
b. 68% $\quad 12.6 \pm \sqrt{12.6}$ $\quad$ POISSON + RULE

c. 95% $\quad 12.6 \pm 2\sqrt{12.6}$

d. z for $x = 20$ $\quad \dfrac{20 - \overset{\mu}{12.6}}{3.55} = 2.08$



e.



z $\quad$ .08

2.0 $\quad \boxed{0.4812}$

ANS = .5 + 0.4812

3. BINOMIAL DISTRIBUTION

n #TRIALS (INDEP)

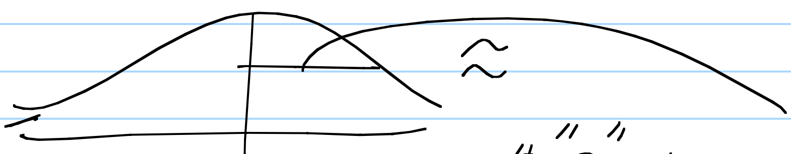
p PR OF "SUCCESS"

$\approx$ NORMAL PROVIDED $np \geq 10$, $n(1-p) \geq 10$

P(PART DEFECTIVE) $= 0.19$

$1-p = .81$ $\quad p = 0.19$ $\quad n = 200$

$\approx$ INDEP

a.  $\approx$

$X = \#$ "D" IN 200

$\mu = np = 200(.19) = 38$

$\sqrt{np(1-p)} = \sqrt{200 \cdot .19 \cdot .81} = 5.55$

b. 68% $\quad 38 \pm 5.55$

IF WISH TO KNOW P(X IN 32 TO 42)

BEST TO USE 31.5 $\quad$ 42.5

c. 95% $\quad 38 \pm 2(5.55)$

IF USE z APPROX

d. $\dfrac{50 - 38}{5.5} = z$ SCORE FOR $50 = x$

2.16

P (MORE THAN 50 D IN 200) $\overset{\text{NAIVE}}{\underset{\text{APPROX}}{=}}$ $P\left(Z > \left(\dfrac{50-38}{5.5}\right)\right)$

≈ 0.015

z	.06
2.1	$\boxed{0.4846}$