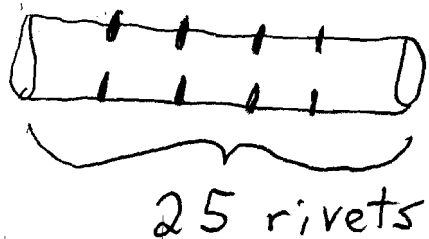


2.5 # 77 (a)

(the answer in the text is wrong)



Choose a random seam S

Let $X = \#$ of rivets in S that are defective.

So we have an equality of events

$$(S \text{ needs reworking}) = (X \geq 1).$$

So we are given

$$P(X \geq 1) = 0.2 \quad (*)$$

The key observation is that

$$X \sim \text{Bin}(25, p)$$

where p is the probability that a rivet is defective (a "success" is a defective rivet)

We have to solve (*) for p . Since

$$P(X \geq 1) = 1 - P(X = 0) = 1 - q^{25}$$

(*) becomes

$$1 - q^{25} = .2 \quad (**)$$

$$q^{25} = .8 \quad (\#)$$

$$25 \log q = \log(.8) = -.09691$$

$$\log q = -.00388$$

$$q = .99111$$

$$p = 1 - q = .00889$$

Here is the mistake in the text. In passing from (**) to (#) they forgot to subtract from 1 so (#) become (incorrectly)

$$q^{25} = .2 \quad (\#\#)$$

This leads to

$$p = .0623490 \dots$$