

STAT220: WINTER 2007: QUIZ 3: March 1

Student name

Section

Please fill in your name and section. Answer the questions, on the question paper.

If you need more space, write on the back of THIS page.

It should take at most 20 minutes to complete this quiz.

Another page with a normal table, and some useful formulas is available: please keep it.

Show your work. You may assume the normal approximation is accurate for all the chances to be computed in this quiz.

Fence segments are made with a stated length of 6' or 72".

Joe wants to fence a 600' length of property-line. He purchases 100 segments of fence.

1. (4 points) In fact, 20% of the fence segments manufactured are shorter than 71".

(i) What is the expected value (EV) of the number of Joe's 100 fence segments that are less than 71" long?

1 pnt **Box average = 20% = 0.2. EV = 100 × 0.2 = 20**

(ii) What is the standard error (SE) of the number of Joe's 100 fence segments that are less than 71" long?

1 pnt **Box SD = $\sqrt{0.2 \times 0.8} = 0.4$. SE = $\sqrt{100} \times 0.4 = 4$**

(iii) What is the chance that 26 or more of Joe's 100 fence segments are less than 71" long?

2 pnts **z-score = $(26 - 20)/4 = 1.5$; between-area=87%; chance = 6.5%**

2. (6 points) More precisely, the manufacturing process results in fence segments that have an average length of 72.2" and an SD of 2". That is, the average excess length over 6' is 0.2" and the SD is 2".

(i) What are the EV and SE of the excess length over 600' of the total of Joe's 100 fence segments?

1.5 pnts **Box average for excess = 0.2", Box SD = 2"**
EV for total excess = $100 \times 0.2 = 20$ "; SE = $\sqrt{100} \times 2 = 20$ "

(ii) Joe has a problem if his fence is more than 603' long; that is a total of 36" excess length. What is the chance of this?

1.5 pnts **zscore = $(36-20)/20 = 0.8$; between-area= 58%; chance = 21%**

(iii) What are the EV and SE of the average length of Joe's 100 fence segments?

1.5 pnts **Box average = 72.2". Box SD = 2 "**
EV = box average = 72.2"; SE = Box SD/ $\sqrt{100} = 2/10 = 0.2$ "

(iv) What is the chance that the average length of Joe's 100 fence segments is less than 72" (6') ?

1.5 pnts **zscore = $(72 - 72.2)/0.2 = -1$; between-area = 68%, chance = 16%**