7.5 #73 p. 384

Here is the correct solution; I think we just grassed the wrong standard deviation

Y = number of 160 people getting a seat on the airplane

$Y \sim \text{Binom}(160, .95)$

$X_i \sim \text{Binom}(1, .95)$

Find $P\left(\sum_{i=1}^{160} X_i \leq 155\right)$:

$$P\left(\sum_{i=1}^{160} X_i \leq 155\right) = P\left(\frac{1}{160}\sum_{i=1}^{160} X_i \leq \frac{155}{160}\right) = P\left(\bar{X} \leq \frac{155}{160}\right) \qquad \bar{X} \approx \text{Norm}(.95, \sigma_{\bar{X}})$$

$$\sigma_{\bar{X}} = \frac{\sigma_{X_i}}{\sqrt{n}} = \frac{\sqrt{.95(.05)}}{\sqrt{160}}$$

Thus, $P\left(\bar{X} \leq \frac{155}{160}\right) \approx P\left(\frac{\bar{X} - .95}{\sigma_{\bar{X}}} \leq \frac{\frac{155}{160} - .95}{\sigma_{\bar{X}}}\right)$

was missing

$$= P\left(Z \leq \frac{\left(\frac{155}{160} - .95\right)\sqrt{160}}{\sqrt{.95(.05)}}\right) = P(Z \leq 1.088214) \approx .86175$$

R

OR better

Since X_i is discrete, and a normal distribution is not,

calculate

$P\left(\sum_{i=1}^{160} X_i \leq 155.5\right)$

put in average of 155, 156 to accommodate continuous approximation

$$\ldots \approx P\left(Z \leq \frac{\left(\frac{155.5}{160} - .95\right)\sqrt{160}}{\sqrt{.95(.05)}}\right) = P(Z \leq 1.269583) \approx .8979$$

book's answer