QUESTION TWO

(a) The 2012 Premier League match attendance had mean stadium occupancy of 92.33% with a standard deviation of 1.65%.

(i) Use a distribution model to estimate the probability that a randomly-selected match had greater than 95% occupancy.

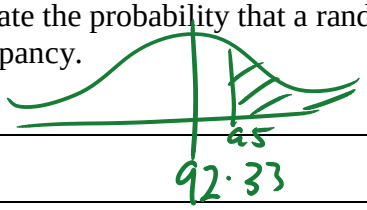
$P(X > 95) = 0.05$

$\sigma = 1.65$

NCD $\mu = 92.33$

LL 95

UL 100000



(ii) State any assumptions that you made in (i). Comment on the validity of these assumptions.

Assuming Normally Distributed because . . .

limitations . . .

(iii) Calculate an estimate for the probability that 4 consecutive games all have less than 90% occupancy. State any assumptions made in your estimate.

$P(X < 90) = 0.0789$

4 times $\Rightarrow 0.0789^4$

$= 0.0000039$

≈ 0.0000

(b) One particular striker always shoots accurately. However, due to the goalie intercepting shots, there is only a 15% chance that any given shot goes into the goal.

success = getting a goal

$p = 0.15$

$n = 3$

(i) If this player has made 3 shots in a game, what is the probability that 2 of them are goals?

Binomial BPD $P(X = 2) = 0.057375$

$= 0.0574$

(ii) This same striker averages 1.5 shots at goal for every 30 minutes of game time. What is the probability that he will take at least 3 shots if he plays a full game (90 minutes)?

$\lambda = \mu = 1.5$ shots per 30 min

$\mu = 1.5 \times 3 = 4.5$ shots per 90 min

$P(X \geq 3) = 1 - P(X \leq 2) = 1 - 0.1736$

$= 0.8264$

POISN PCD, $x = 2$, $\mu = 4.5$

menu 1 − [shift][stat] 0 1 2 3 4 5 6 7

(iii) Given the information in b(i) and b(ii), what is the average number of goals this striker could expect to score in a full game?

15% chance that a shot goes in (goal)

average of 4.5 shots per game

15% of 4.5 $= 15 \div 100 \times 4.5 = 0.675$

QUESTION THREE

continuous Uniform Dist $\mu = \frac{a+b}{2}$

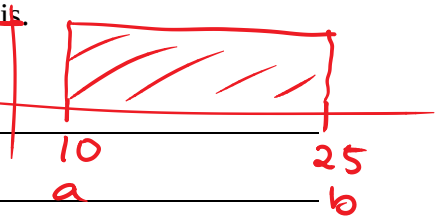
(a) A certain reserve striker is given anywhere between 10 and 25 minutes playing time in a game.
In general, he averages 0.2 shots at goal per minute in his first 15 minutes of play and 0.15 shots per minute after that.

$\sigma = \frac{b-a}{\sqrt{12}}$

(i) Estimate the mean and standard deviation of the time the striker will spend on the field during a game. Identify the model that you used to do this.

Uniform Dist

$\text{mean} = \frac{10+25}{2} = 17.5$



$\sigma = \frac{b-a}{\sqrt{12}} = \frac{(25-10)}{\sqrt{12}} = \frac{15}{\sqrt{12}} = 4.33$

(ii) Estimate the average number of shots that this player will take per game.

Est they will play for 17.5 minutes

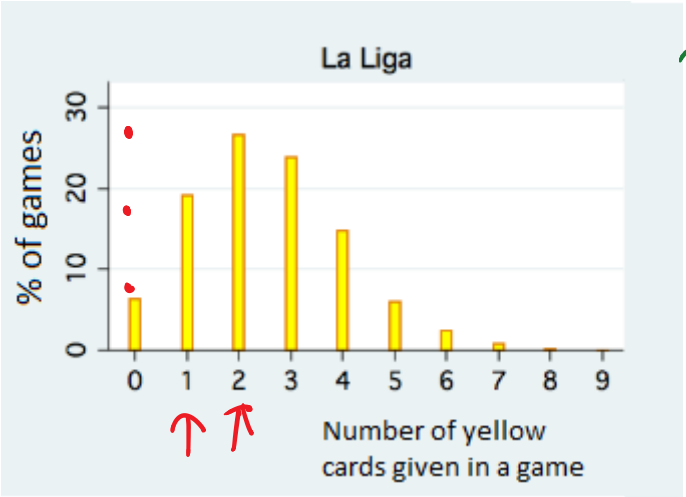
$0.2 \times 15 + 0.15 \times 2.5 = 3.375$ shots per game

ie about 4 shots

per g

(b) The Spanish Premier League is known as "La Liga". The distribution for the number of yellow cards given in the 2010 season is shown below.

Discrete Binm or Pois



(i) Assuming that the number of yellow cards given out in a game is a random variable, estimate the average number of yellow cards per game. Show how this was calculated.

μ = Expected Number = $E(X) = \Sigma x \times p(x)$

$= 0 \times 0.7 + 1 \times 0.19 + 2 \times 0.27 + 3 \times 0.24$
$+ 4 \times 0.15 + 5 \times 0.6 + 6 \times 0.3 + 7 \times 0.2 + 8 \times 0.$

$=$