Assignment 5

My score

92% (9.2/10)

Q1

9.2 / 10

ch3_conv_ass.pdf

Question 2: In the condition “If the number of balls of this color is not less than the number of balls of the other color”, the number of balls means the number of balls left in the urn after the draw.

1.

we know $p[X_n(S)=0] = 0.5 = p[X_n(S)=1]$.

$\therefore X_n$ is ~~as~~ $\cdots$ to $[0.1]$

and doesn't converge in probability, a.e.

and. this is a $[0.,1]$ distribution.

~~p(Xn(s))~~ $F_n(k) = \begin{cases} 0 & x<0 \\ \frac{1}{2} & x\in[0.1] \\ 1 & x\geq 1 \end{cases}$

$\therefore$ this converge to distribution when $n\to\infty$

2.

$E[X_1(S)] = 3/3$ $E[X_2(S)] = \frac{X_1(S)^2 + 3X_1(S)}{3}$

$\therefore$ when the n is $\to\infty$. the number of ball is from 1 to 3.

$\therefore E[X_1(S)]$ not converge ~~to~~.

?

3.

(a) $U_n(s) = s/n$

$|U_n(s) - U(s)| = |U_n(s) - 0| = |U_n(s)| = s/n$

and s is $[0, 1]$.

$\therefore s/n < \varepsilon$

$\therefore \lim_{n\to\infty} P(|U_n(s) - U(s)| < \varepsilon) = 1$.

$U_n(s) - U(s) < \varepsilon$

$\therefore U_n(s)$ ~~to~~ converge to e

(b) $V_n(s) = s(1 - 1/n)$

when $n \to \infty$ $1 - 1/n = 1$ $V_n(s) = s$

$\lim_{n\to\infty} |V_n(s) - V(s)| = \lim_{n\to\infty} |s/n| = 0$.

$\therefore$ ~~P~~ $\{\lim P |V_n(s) - V(s)| = 0\} = 1$

$\therefore V_n(s) \xrightarrow{a.e} s$ as $n \to \infty$.

(c) $W_n(s) = \cos(2\pi n s)$

~~when $n \to \infty$~~ ~~$\cos(2\pi s) = 1$ or -1 or 0~~

$W_n(s)$ does't convergo . Becaus differet s will. cause different ~~vaue~~.
value.

4.

$n = 2^j + k$

$k = n - 2^j \Rightarrow k/2^j = n/2^j - 1$

$k+1/2^j = \frac{n+1}{2^j} - 1$

$\therefore \lim_{n\to\infty} P|Y_n(s) - Y(s)| > \varepsilon) = \lim_{n\to\infty} P|Y_n(s)| > \varepsilon)$

when $\varepsilon \geq 1$

$\lim_{n\to\infty} P|Y_n(s)| > \varepsilon| = 0.$

when $\varepsilon \in (0.1)$ $n \to \infty$. $k+1/2^j = \frac{n+1}{2^j} - 1 \to 0$

$k/2^j = n/2^j - 1 \to 0$.

$\therefore \lim_{n\to\infty} P|Y_n(s) > \varepsilon| = 0.$

$\therefore Y_n(s) \xrightarrow{P} 0$ as $n \to \infty$!

But from $n/2^j - 1$ to $n+1/2^j - 1$, there still have some $Y_n(s) \neq 0$.

$\therefore Y_n(s)$ not converge in a.e.