students solve All this questions on recurrence rel^n, sequence & series

Tutorial 7 on Recurrence Rel^n

Tutorial: 7

Q.1) Determine which of the following are linear Homogeneous recurrence rel^ns with constant coefficients. Also find the degree of those that are.

a) $a_n = 3a_{n-1} + 4a_{n-2} + 5a_{n-3}$

b) $a_n = 2n\,a_{n-1} + a_{n-2}$

c) $a_n = a_{n-1}^2 + a_{n-2}$

d) $a_n = a_{n-1} + n$

e) $a_n = 4a_{n-2} + 5a_{n-4} + 9a_{n-7}$

f) $a_n = 3$

Q.2) Solve the recurrence rel^n with initial condition.

a) $a_n = 6a_{n-1} - 8a_{n-2}$. for $n \geq 2$ $a_0 = 4, a_1 = 10$

b) Find all soln^s of the recurrence rel^n

$a_n = 7a_{n-1} - 16a_{n-2} + 12a_{n-3} + n4^n$

(No need to find ~~arbitro~~ value of unknown)

Q.3) ~~Solve~~ ~~Find~~ What is the general form of the particular soln of the Non Homogeneous recurrence relation whose characteristic eq^n & $f(n)$ is

a) $(r-1)^3 \cdot (r-2) = 0$ & $f(n) = (n^2+n+5)$

b) $(r-2)^2 \cdot (r-5) = 0$ & $f(n) = (n+1)2^n$

Q4) Let, a_n = Total No. of decimal strings of length n which contains even No. of 0's.
Then find recurrence rel^n for a_n. ?

Q5) Use generating functions to solve the recurrence rel^n

$a_k = a_{k-1} + 2a_{k-2} + 2^k$ with the Initial conditions $a_0 = 4$ & $a_1 = 12$

Q.6) i) Show that the sequence $a_n = \frac{\sqrt{n^2+1}}{\sqrt{n}}$ is divergent.

ii) ~~Show~~ Determine whether the sequence.

$$a_n = \frac{n\,2^n}{\sqrt{n+(2004).n^2}}$$

iii) Determine whether the series $\sum_{n=1}^{\infty}\left(\frac{1}{n\sqrt{n}+n^2}\right)$

iv) Determine whether the series $\sum_{n=1}^{\infty}\frac{n(n+1)}{(n-2)(n^3-3)}$ is cgt or Not.

v) Determine the radius of convergence of power series $\sum_{n=0}^{\infty}\left(\frac{2n}{n+1}\right)x^n$