PreCalc 11 Final Review Chp 1

Note Title 2016-05-25

element of

1.1) Arithmetic Sequences – is a linear function

$t_n = t_m + d(n-m)$, $n > m$; $n, m \in \mathbb{N}_1$; m is usually 1; term #'s

t_n, t_m are term values.

d – common difference, $d \in \mathbb{R}$

If d is not constant, then not arith seq.

$d < 0$ – decreasing seq, $d > 0$ – increasing seq.

When testing if a term is part of a seq, calc n or m and check $n, m \in \mathbb{N}_1$

1.2) Arithmetic Series – sum of finite arith seq.

Can't do sum of an infinite arith seq.

$S_p = \frac{p(t_1 + t_p)}{2}$ or $S_p = \frac{p(2t_1 + d(p-1))}{2}$

$S_p = t_1 + t_2 + \ldots + t_p$ $S_p = S_{p-1} + t_p$

Sometimes p = n from 1.1 but not always, so be careful when answer question.

Determine if you have t_p or d. If you have t_m & t_n then you need to calculate d from 1.1.

eg) $\underset{m}{t_2} = 4$ $\underset{n}{t_5} = 19$ calc $\underset{p}{S_7}$

$t_n = t_m + d(n-m)$

$19 = 4 + d(5-2)$

$15 = 3d$

$d = 5$

$t_1 = t_2 - d = 4 - 5 = -1$

$$S_p = \frac{p(2t_1 + d(p-1))}{2}$$

$$= \frac{7(2(-1) + 5(7-1))}{2}$$

$$= \frac{7(-2 + 30)}{2}$$

$$= 7(14) = 98$$

approaches

1.3) Geometric Seq – more real-life modelling

Look for a common ratio (mult/div), 'r'

$-1 < r < 1$, the seq → 0; $|r| > 1$, seq → ±∞

convergent divergent

$r = -1$, divergent but not → ±∞

$t_n = t_m (r)^{n-m}$, $n > m$; $n, m \in \mathbb{N}_1$

$r = \frac{t_{n+1}}{t_n}$

$r < 0$, it's oscillating about x-axis.

Solving for r will require taking the nth root.

Solving for n will require logarithms.

eg) Find r

$\underset{m}{t_2} = 6$ $\quad \underset{n}{t_6} = 96$

$t_n = t_m (r)^{n-m}$

$96 = 6 (r)^{6-2}$

$16 = r^4$

$\sqrt[4]{16} = r = 16^{(1/4)}$

$\pm 2 = r$

$\longrightarrow$

eg) Find n

$t_{\underset{\overset{\uparrow}{m}}{3}} = 15 \quad r = 3 \quad t_n = 1215$

$1215 = 15(3)^{n-3}$

$81 = 3^n \cdot 3^{-3}$

$81 \cdot 27 = 3^n$

$\frac{\log(81 \cdot 27)}{\log 3} = n$

$n = 7$

1.4) Geom Series - sum of finite geom seq.

$$S_n = \frac{t_1 - t_{n+1}}{1-r} = \underset{r<1}{\frac{t_1(1-r^n)}{1-r}} = \underset{r>1}{\frac{t_1(r^n-1)}{r-1}}, \quad r \neq 1 \quad \text{NPV}$$

Same as 1.2 solving S_n, plug in & solve.

Harder problem is to solve for t_1 - algebra.

Difficult problem is to solve for n, use logs.

1.6) Infinite Geom Series.

$S_\infty = \frac{t_1}{1-r}$, $|r| < 1$ – REALLY IMPORTANT!

1.5) Graphs of Geometrics

- If seq → 0, Series → inf geom series. ↷
- If seq oscillates, series oscillates about IGS.
- If $|r| > 1$, series → ±∞
- If $|r| < 1$, series → IGS.