Review for Test 4

Date:

Sequences

- notation: $\{t_1, t_2, t_3, \cdots, t_n\}$
- arithmetic, $t_n = a + (n-1)d$
- geometric, $t_n = ar^{n-1}$
- recursive, t_n is defined in terms of previous terms; ***must be initialized*** (starting values defined.)

Series

- arithmetic,
$$S_n = \sum_{i=1}^{n} [a + d(i-1)] = \frac{n(t_1 + t_n)}{2} = \frac{n}{2}[2a + (n-1)d]$$
- geometric,
$$S_n = \sum_{i=1}^{n} ar^{i-1} = \frac{a(r^n - 1)}{r-1} = \frac{a(1-r^n)}{1-r}$$
- infinite geometric,
$$S_\infty = \sum_{i=1}^{\infty} ar^{i-1} = \frac{a}{1-r},\ |r| < 1$$

Pascal's Triangle

- definition of the elements of Pascal's Δ, $t_{n,r}$
- $t_{n,r} = {}_nC_r \text{ or } \binom{n}{r},\ r \,\&\, n = \{0, 1, 2, \cdots\}$
- $t_{n+1,r} = t_{n,r} + t_{n,r+1}$

Binomial Theorem

- expansion of $(x+y)^n = \sum_{r=0}^{n} \binom{n}{r} x^{n-r} y^r$
- general term, $t_{k+1} = \binom{n}{k} x^{n-k} y^k$
- product of binomials, $(\quad + \quad)^m (\quad + \quad)^n$

Financial Math

- Simple interest
- Compound interest & present value
- Future amount & present value of an ordinary annuity
- special cases:
  - deferred annuity
  - payment when $n = 0$ (pay first)
  - interest compounding periods do not match payment periods
- mortgages

Not on Test (even though they're cool)

- Using Binomial Theorem, expanding a power of a trinomial, $(ax^2 + bx + c)^n$
- arithmetico-geometric series from 1st principles only
- arithmetico-geometric ***formula*** (memorizing formula is not required)
- sigma notation & properties of sigma notation
- rapid sums formulas provided:
$$\sum i = \frac{n(n+1)}{2},\ \sum i^2 = \frac{n(n+1)(2n+1)}{6},$$
$$\sum i^3 = \left[\frac{n(n+1)}{2}\right]^2$$
- payment schedules (spreadsheets)
- proof by mathematical induction