# Class_26 Dec 8 - Unit 4 Test p-v

Thursday, December 8, 2022 3:57 PM

**Tonight's Class:**

- **"Exit" questionnaire**
- **Do the LEC Student Survey: bit.ly/LEC-StudentSurvey**
- **Unit 4 Test questions?**
- **Hand in Geometric Series assignment**
- **Unit 4 Test**
  - **If you decide you wish to do the Unit 4 Test rewrite, please come to class (regular place and time) on Tuesday, Dec 13**

## Summation/sigma notation shows up in many places

1. **Money**

**Present value of a future sum** [edit]

The present value formula is the core formula for the time value of money; each of the other formulae is derived from this formula. For example, the annuity formula is the sum of a series of present value calculations.

The present value (*PV*) formula has four variables, each of which can be solved for by numerical methods:

$$PV = \frac{FV}{(1+i)^n}$$

The cumulative present value of future cash flows can be calculated by summing the contributions of $FV_t$, the value of cash flow at time *t*:

$$PV = \sum_{t=1}^{n} \frac{FV_t}{(1+i)^t}$$

Note that this series can be summed for a given value of *n*, or when *n* is ∞.[8] This is a very general formula, which leads to several important special cases given below.

2. **Computer science**

https://everythingcomputerscience.com/discrete_mathematics/Summations.html

1. **More math**
   http://homepages.gac.edu/~holte/courses/mcs256/documents/summation/top10sums.pdf

   https://www.math.ucdavis.edu/~kouba/CalcTwoDIRECTORY/summationdirectory/Summation.html

   https://mathworld.wolfram.com/ExponentialSumFormulas.html
2. **Ultrasound imaging research**

This is describing cross-talk interference between two points when doing ultrasound imaging.

where $t$ is only required to take on values in
$T_{i,j}(k) = \left[\max(t_{j\to k}, t_{i\to k}), L_m + \min(t_{j\to k}, t_{i\to k})\right]$ for any given $k$.

$$\langle \Phi_j, \Phi_i \rangle = \sum_{m',m} a_m(j) a_{m'}(i) \sum_k \frac{1}{|r_k - r_j|} \frac{1}{|r_k - r_i|} \sum_{t'} h_m(t') h_{m'}(t' + t_{j\to k} - t_{i\to k})$$

It is intuitive to view this as a sort of cross-correlation. To make this clearer, we reorder the sums and make a change of variables to $t' = t - t_{j\to k}$:

**A few closing thoughts…**

**Unit 4 Test (Chapter 9, Geometric Sequences and Series)**

**Please:**

1. **Make sure your name is on the Geometric Sequences/Series assignment and hand it in.**

2. **Clear your desk of any materials except for your calculator & something to write with. I will give you a Formula Sheet.**

3. **On your test, write clearly and show all necessary steps. When done, please hand in your test and you are free to go.**

**My goal is to mark the tests tomorrow and post the marks as soon as I can. If you decide you wish to do the Unit 4 Test rewrite, come to class on Tuesday, Dec 13. (If you don't wish to do the rewrite, you do not need to attend class on Tuesday.)**