3/4/2016 Spring 2016, Patterns in Mathematics I Sitaraman

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HW10 comments

Here are **the formulae that you will need for this set:**

Problem 1: Basically you need to find a and r and then use the formula $a(1-r^n)/(1-r)$ if there are a finite number, say n, terms in the sequence, to find the sum. If sum is infinite remember that we need $-1 < r < 1$ in order for the infinite sum to be a finite number.The formula for inifinite sum is $a/(1-r)$. If sequence is given using sigma notation just write down first few terms by looking at the sum for $n = 1, 2, 3$,etc., (or whatever are the first few indices) and find a and r using them. For example, $\sum_{n=1}^{\infty} 3(0.1)^{n-1}$ will have $a_1 = a = 3(0.1)^0 = 3, a_2 = 3(0.1)^1 = 0.3$, etc., Clearly r in this case is 0.1. If r is hard to find, just divide any term by previous term.

Problem 2: First find a and r from first few terms. Now remember that n-th term of a geometric sequence is ar^{n-1}. So you first need to figure out r^n from the final term by multiplying it by r and dividing by a because $ar^{n-1} \times (\frac{r}{a}) = r^n$. Then plug in a, r and r^n into the formula for the sum of n terms of a geometric sequence (see problem 1 above).

Problem 3 : Arithmetic sequences. Similar to problem 1 of hw7. If k does not appear n the formula for a_k it means you have just the same number repeating. example: $\sum_{1}^{9} 6$ just means 6+6+6+...+6 added 9 times.

Problem 4: Similar to problem 1 of hw8.

P is the amount of the initial loan. $n = 52$ because payments are made weekly.

Monthly payments for a mortgage or loan formula

$$m = P \frac{r/n}{\left(1 - \frac{1}{\left(1+\frac{r}{n}\right)^{nt}}\right)}$$

Find what is P, r and t and plug it into the mortgage formula above.

To find the interest multiply the weekly payments you just found by number of weeks and then subtract amount of initial loan. This is the excess they paid, in the form of interest.

Problem 5. Similar to problem 4 of hw8. We have:

Total value of a periodic investment such as a retirement account

$A(t)$ is the amount after t years, r is the annual rate of interest, n is number of times interest is compounded each year (in this case $n = 12$) and m is the periodic payment or investment in the savings or retirement account.

$$\text{formula} \quad A(t) = m \frac{\left(\left(1 + \frac{r}{n}\right)^{nt} - 1\right)}{r/n}$$

Plug in the appropriate quantitites into this formula.