A selection of old quiz problems about sequences and series.

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Analysis Quiz

Name ________________

Intro to counting

Part 1. Multiple guess. Place answers in the blank provided.

For problems 1 – 4 classify each as (A) Arithmetic, (G) Geometric, (N) Neither.

_____ 1. 17, 25, 33, 41, 49, …

_____ 2. $t_n = \sin(\frac{n\pi}{2})$

_____ 3. $t_n = 2n^2 - 5$

_____ 4. $\begin{cases} t_1 = 6 \\ t_n = \frac{1}{4} t_{n-1} \end{cases}$

_____ 5. $\frac{3}{4}, \frac{4}{7}, \frac{5}{12}, \frac{6}{19}, \frac{7}{28}, ...$

For problems 6 – 7 give the first four terms of each.

__________ 6. $t_n = \frac{n(n+1)}{2}$

__________ 7. $t_n = \frac{1}{\sqrt{5}}(\alpha^n - \beta^n)$, where $\alpha = \frac{1+\sqrt{5}}{2}$, and $\beta = \frac{1-\sqrt{5}}{2}$

For problems 8 – 9 give explicit formulas for each of the following:

__________ 8. 7, 10, 13, 16, …

__________ 9. $\frac{3}{4}, \frac{4}{7}, \frac{5}{12}, \frac{6}{19}, \frac{7}{28}, ...$

For problems 10 – 11 classify each of the following as (A) sequence or (B) series.

______ 10. 1, 2, 3, 4, 5, 6, …

______ 11. 1+2+3+4+5+, … +5

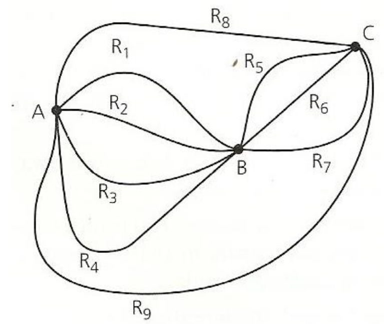
Find the following sums.

_______ 12. $1 + 2 + 3 + \ldots + 157$

______ 13. $\sum_{i=1}^{4} \frac{1}{2^i}$

_____ 14. Jimmy is still big into cycling. This time he starts at town A, and rides to town B. By how many different routes may Jimmy have made this trip?

A. 4 B. 8 C. 10 D. 16 E. 20 F. 17 G. 12 H.



____ 16. In how many ways can a 10 member club elect 3 officers, with the usual rule in place a person can hold at most one office.

A. ${}_{10}P_3$ B. ${}_{10}C_3$ C. 10^3 D. 3^{10} E. none of these are correct.

____ 17. How many distinct 5 card hands of cards are possible?

A. ${}_{52}P_5$ B. 52! C. ${}_{52}C_5$ D. 52^5 E. 47!

18. Find the following sum; $247 + 252 + 257 + \ldots + 962$

20. Use the following to estimate the $\sin(37^o)$ $\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + - \ldots$

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Factors of integers.

Sums of factors of integers.

Both counting and series ideas may be helpful in what follows.

It may be productive to find the factors of some of the smaller given integers (like 10) by simply listing them. Then, try to find a pattern which will help find the factors of larger givens like 1,000,000.

Some Integers	Find how many distinct positive integral factors each has.	Find the sum of the distinct positive factors of the given integer
10		
100		
1000		
1,000,000		

1,000,000,000		
1,000,000,000,000		
124		
1001		
2009		
2010		

Analytic Geometry   Quiz Ch 13

Please show work on all problems.   Name ____________________

1. If $t_n = 7 - 2n$ then give the first 5 terms and tell whether the sequence is arithmetic, geometric, both or neither.

_____, _____, _____, _____, _____

2. Give an explicit formula for the following sequence: 7, 10, 13, 16, …

3. Find the sum of this arithmetic sequence: 2 + 6 + 10 + 14 + … + 278

4. Evaluate this limit; $\lim \frac{5n^3 + 2n^2 - 7n - 13}{9n^3 - 13n^2 + 21n + 121}$

5. Find the indicated sum: $1 + \frac{1}{2} + \frac{1}{4} + \ldots + \frac{1}{64}$

6. Find the indicated sum: $1 + \frac{1}{2} + \frac{1}{4} + \ldots$

7. Rewrite 3 + 5 + 7 + 9 + . . . 1013 using sigma notation.

A series of problems involving series. Analysis Name ________________

Some easy probs to warm up: (this whole set is more challenging)

1. Derive the formula $S = \dfrac{t_1}{1-r}$**,** and tell what the variables and subscripts stand for, and the conditions under which it can be used.

State the 5 formulas we have been using.

2. Find t_{40} in the sequence: 3, 7, 11, 15, …

These first few can be done as a series of series:

3. Compute: $\frac{1}{2}+\frac{2}{4}+\frac{3}{8}+\frac{4}{16}+\frac{5}{32}+...$

4. Compute: $\frac{5}{1}+\frac{6}{3}+\frac{7}{9}+\frac{8}{27}+\frac{9}{81}+...$

5. Compute: $\frac{1}{10^0}+\frac{2}{10^1}+\frac{3}{10^2}+\frac{4}{10^3}+\frac{5}{10^4}+\frac{6}{10^5}+\frac{7}{10^6}+...$

6. Compute: $\frac{1}{10^0}+\frac{1}{10^1}+\frac{2}{10^2}+\frac{3}{10^3}+\frac{5}{10^4}+\frac{8}{10^5}+\frac{13}{10^6}+...$

7. Find the sum: $\frac{1}{2}+\frac{1}{6}+\frac{1}{12}+...+\frac{1}{n(n+1)}+...$

8. Find the sum of the first 20 terms of the series given in problem 6.

9. Compute: $\frac{4}{3}+\frac{5}{9}+\frac{6}{27}+\frac{7}{81}+\frac{8}{243}+...$

10. Consider the sequence: -3,0,7,18,33,52,75, … Find a polynomial p(n) which generates this sequence for integer values of n, with n =1, 2, 3, … (see following pages)

11. Find a formula for the sum: $1\cdot 2\cdot 3+2\cdot 3\cdot 4+3\cdot 4\cdot 5+...+n(n+1)(n+2)$

12. Show that $1\cdot 2+2\cdot 3+3\cdot 4+...+n(n+1)=\dfrac{n(n+1)(n+2)}{3}$