

Fall 2007
Math 110, Section 47

Exam #4

Student's Name (please print): _____

By signing my name below, I agree that I am following all rules and regulations set forth by the Code of Academic Integrity. Furthermore, I agree that I am following all rules set by my instructor and by the course policy for this exam. This includes ensuring that all calculator programs except possibly EVALUATE and QUADRATIC FORMULA have been deleted.

Signature: _____ Date: _____

No partial credit for multiple choice.

For all others, show all algebraic work to receive full credit.

Please turn OFF all cell phones, pagers, and other communication devices and stow them out of sight. All textbooks, notes, etc. must also be put away.

Good luck!

FORMULAS

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

$$A = Pe^{rt}$$

$$a_n = a_1 + (n-1)d$$

$$a_n = a_1 r^{n-1}$$

$$S_n = n\left(\frac{a_1 + a_n}{2}\right)$$

$$S_n = \frac{n}{2}[2a_1 + (n-1)d]$$

$$S_n = a_1\left(\frac{1-r^n}{1-r}\right), r \neq 1$$

$$\sum_{k=1}^{\infty} a_1 r^{k-1} = \frac{a_1}{1-r}, |r| < 1$$

Summation Formulas:

$$\sum_{k=1}^n k = \frac{n(n+1)}{2}$$

$$\sum_{k=1}^n k^2 = \frac{n(n+1)(2n+1)}{6}$$

1. Compute $\sum_{k=10}^{42} 5$.

- a) 165
- b) 420
- c) 210
- d) 160
- e) 155

2. The sequence a_n is given by:

$$1, \frac{2}{4+1}, \frac{4}{9+1}, \frac{8}{16+1}, \dots$$

Which of the following are the next two terms of the sequence?

- a) $\frac{12}{25+1}, \frac{16}{49+1}$
- b) $\frac{12}{23+1}, \frac{16}{30+1}$
- c) $\frac{16}{25+1}, \frac{25}{49+1}$
- d) $\frac{16}{25+1}, \frac{32}{49+1}$
- e) $\frac{16}{23+1}, \frac{32}{30+1}$

Which of the following is a formula for the n^{th} term of the sequence?

- a) $a_n = \frac{4n-8}{a_{n-1}+7+1}$
- b) $a_n = \frac{4n-8}{n^2+1}$
- c) $a_n = \frac{(n-1)^2}{n^2+1}$
- d) $a_n = \frac{2^{n-1}}{9+7(n-3)+1}$
- e) $a_n = \frac{2^{n-1}}{n^2+1}$

1. $\sum_{k=0}^{\infty} \frac{(-1)^k}{k!}$ is equal to:

- a) $\frac{-1}{1} + \frac{1}{1} - \frac{1}{2!} + \frac{1}{3!} - \frac{1}{4!} + \frac{1}{5!} - \dots$

- b) $\frac{1}{1} - \frac{1}{1} + \frac{1}{2!} - \frac{1}{3!} + \frac{1}{4!} - \frac{1}{5!} + \dots$
 c) $\frac{-1}{1} - \frac{1}{1} - \frac{1}{2!} - \frac{1}{3!} - \frac{1}{4!} - \frac{1}{5!} - \dots$
 d) $\frac{-1}{0} + \frac{1}{1} - \frac{1}{2!} + \frac{1}{3!} - \frac{1}{4!} + \frac{1}{5!} - \dots$
 e) $\frac{-1}{0} + \frac{1}{1} - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \dots$

2. The sum $\sum_{k=1}^{30} 3k-2$ is equal to:

- a) $15 \cdot 31 - 60$
 b) $15 \cdot 31 - 30$
 c) $45 \cdot 31 - 60$
 d) $45 \cdot 29 - 60$
 e) $45 \cdot 29 - 30$

3. Let a_n , b_n be two sequences. Which of the following MUST be TRUE?

- (I) If a_n and b_n are arithmetic sequences, then so is $a_n + b_n$
 (II) If a_n and b_n are geometric sequences, then so is $a_n + b_n$
 (III) If a_n and b_n are arithmetic sequences, then so is $a_n \cdot b_n$
 (IV) If a_n and b_n are geometric sequences, then so is $a_n \cdot b_n$

- a) I and III only
 b) II and IV only
 c) II and III only
 d) III and IV only
 e) I and IV only

4. How many terms are there in the following finite sequence?

$$-2, 1, 4, 7, \dots, 292$$

- a) 98
 b) 99
 c) 100
 d) 101

5. Fill in the following tables for the arithmetic sequence a_n and the geometric sequence b_n .

a_n	b_n
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-2	7
2	
	$\frac{1}{7}$
10	
	$\frac{1}{343}$

6. Find a_6 given that $a_n = -2$ for $n \leq 3$ and $a_n = -3a_{n-1} + 1$ for $n > 3$.
- 20
 - 61
 - 2
 - 43
 - 59
7. $\frac{75!}{72!}$ is equal to:
- Overflow
 - 6
 - 25,681
 - 405,150
8. The 10th term of the sequence 2, 6, 18, 54, ... is:
- 118,098
 - 59,049
 - 39,366
 - 19,683
 - 258,280,326
9. The sum of the first 30 odd numbers is equal to:
- f
10. According to a common interpretation (which is wrong...) of Moore's law, the speed of computer processors doubles itself every 18 months.

What will be a typical speed of a computer processor in 12 years, assuming that the typical speed of a computer processor today is 2GHz.

- a) 16 GHz
- b) 32 GHz
- c) 128 GHz
- d) 256 GHz
- e) 512 GHz

11. The sum $\sum_{k=1}^{10} 2 \cdot \left(-\frac{2}{3}\right)^{k-1}$ is equal to:

12. The 3rd of an arithmetic sequence is 13 and the 20th term is 81.
Find the common difference and the expression for the n^{th} term.

13. According to the Malthusian growth model, the world population is growing exponentially.

- a) Assuming that the world population has doubled itself since 1963, what would be the world population in 2050 as a percentage of the world population today?

- b) If the world population today is approximately 6.6 billion, what will be the world population in 2050?

MORE QUESTIONS!

3. If $\sum_{k=1}^n k = 5050$, what is the value of n ?

- a) -101
- b) 100
- c) 100 and -101
- d) 100 and 101
- e) 101

4. The value of $\sum_{k=3}^{20} k^2$ is:

- a) 2870
- b) 2865
- c) 6930
- d) 7984.667