

Sequences and Series Review Problems

In 1-3, suppose that $a_2 = 40$ and $a_4 = 50$.

1. If $\{a_n\}$ is arithmetic, find a_{20} .
2. If $\{a_n\}$ is geometric, find a_{20} .
3. If $\{a_n\} = pn^2 + q$ for some real numbers p and q , find a_{20} .
4. Let $\{b_n\}$ be an arithmetic sequence whose first and fifth terms have sum 18 and product 72. Find all possible values for the 10th term of the sequence.
5. This recursive sequence isn't as bad as it looks: $a_1 = 3$, and $a_n = \frac{a_{n-1} + 1}{1 - a_{n-1}}$. Find a_{2009} without a calculator if possible.

6. On day 1 of an experiment, an entomologist catches 60 bugs. On day 2, she catches 64 bugs. If the number continues increasing by 4 each day, how many bugs will she catch on the first 20 days?

7. Consider the series $\sum_{n=1}^{40} \frac{17^{n/2}}{5^n}$.

- a. By computing the ratio a_{n+1}/a_n , show that the series is geometric.
- b. Find the sum. (COBRA).

8. Suppose that $\sum_{k=1}^n a_k = 17$. Find if possible

- a. $\sum_{k=1}^n 2a_n$
- b. $\sum_{k=1}^n (a_k - 1)$
- c. $\sum_{k=1}^n a_k^2$

9. Find a formula for each sequence or series

- a. $3 + 12/5 + 48/25 + 192/125 + \dots$
- b. $5 + 7/2 + 9/4 + 11/8 + \dots$
- c. $1/2, 1/5, 1/10, 1/17, \dots$

10. If $\sum_{n=1}^{\infty} \frac{(x+1)^n}{3^{2n}}$ converges, find all possible values of x .

11. You open a bank account with \$1000 on your birthday. A year later, your account has earned 4% interest, but you withdraw \$150 to take your friends out for your birthday. (So after one year, you have \$890.) This pattern continues every year. Model this situation using the spreadsheet on your calculator to find out how long you have money left in your bank account.