Math 1314
Chapter 8 Review

1. Write the first 5 terms of $\{a_n\}$ if $a_n = \frac{(-1)^{n+1}}{2^n + 1}$.

2. Write the first 5 terms of $\{a_n\}$ if $a_1 = 2$ and $a_n = 5a_{n-1}$ for all n > 1.

3. Write the first 4 terms of $\{a_n\}$ if $a_n = \frac{(n+1)!}{n^2}$.

4. Evaluate $\frac{20!}{2!18!}$.

5. Evaluate $\frac{(2n+1)!}{(2n)!}$.

6. Find the sum $\sum_{k=1}^{4}(k+3)(k+2)$.

7. A deposit of $10,000 is made in an account that earns 8% compounded quarterly. The balance in the account after n quarters is $a_n = 10000\left(1 + \frac{.08}{4}\right)^n$. Find the balance in the account after 6 years by finding a_{24}.

8. Write the first 6 terms of the arithmetic sequence if $a_1 = \frac{3}{4}$ and $d = -\frac{1}{4}$.

9. Write the first 6 terms of the arithmetic sequence if $a_n = a_{n-1} - 20$, $a_1 = 50$.

10. Find the 15th term of the arithmetic sequence if $a_1 = -60$ and d = 5.

11. Write the formula for a_n term of the arithmetic sequence if $a_1 = -70$ and d = -5.

12. Write the formula for the a_n term of the arithmetic sequence if $a_n = a_{n-1} - 12$, $a_1 = 24$.

13. Find the sum of the first 50 terms of -15, -9, -3, 3, …

14. Find the sum of the first 80 positive even numbers.

15. Find the sum of the odd integers between 30 and 154.

16. Find $\sum_{i=1}^{50} -4i$.

17. A company offers a starting yearly salary of \$33,000 with raises of \$2500 a year. Find the total salary over a 20 year period.

18. Write the first 5 terms of the geometric sequence if $a_1 = 24$ and $r = \frac{1}{3}$.

19. Write the first 5 terms of the geometric sequence if $a_n = -6a_{n-1}$ and $a_1 = -2$.

20. Find the 40th term of the geometric sequence if $a_1 = 1000$ and $r = -\frac{1}{2}$.

21. Find the formula for the a_n term of the geometric sequence $5, -1, \frac{1}{5}, \ldots$ and then use the formula to find the 8th term of the sequence.

22. Find the sum of the first 11 terms of 4, -12, 36, -108,…

23. Find the sum of the first 14 terms of $-\frac{1}{24}, \frac{1}{12}, -\frac{1}{6}, \frac{1}{3}, \ldots$

24. Find the $\sum_{i=1}^{7} 4(-3)^i$.

25. Find the sum of $5 + \frac{5}{6} + \frac{5}{6^2} + \frac{5}{6^3} + \ldots$

26. Find $\sum_{i=1}^{\infty} 12(0.7)^{i-1}$.

27. Express the repeating decimal $.\overline{529}$ as a fraction in the lowest terms.

28. Suppose you save \$1 the first day of the month, \$2 the 2nd day of the month, \$4 the 3rd day, etc. What will you put aside for savings on the 30th day of the month? What will your total savings be for the first 30 days?

29. Evaluate $\binom{15}{2}$.

30. Use the Binomial Theorem to expand $\left(x^2+y\right)^4$ and simplify each term.

31. Use the Binomial Theorem to expand $\left(2x-3y\right)^5$ and simplify each term.

32. Find the 4^{th} term of $\left(y^3-1\right)^{20}$.

33. Find the 4^{th} term of $\left(x+\frac{1}{2}\right)^5$.

Answers

1. $a_1 = \frac{1}{3}, \quad a_2 = -\frac{1}{5}, \quad a_3 = \frac{1}{9}, \quad a_4 = -\frac{1}{17}, \quad a_5 = \frac{1}{33}$
2. $a_1 = 2, \quad a_2 = 10, \quad a_3 = 50, \quad a_4 = 250, \quad a_5 = 1250$
3. $a_1 = 2, \quad a_2 = \frac{3}{2}, \quad a_3 = \frac{8}{3}, \quad a_4 = \frac{15}{2}$
4. 190
5. 2n +1
6. 104
7. $16084.37
8. $\frac{3}{4}, \frac{1}{2}, \frac{1}{4}, 0, -\frac{1}{4}, -\frac{1}{2}$
9. 50, 30, 10, -10, -30, -50
10. 10
11. $a_n = -65 - 5n$
12. $a_n = 36 - 12n$
13. 6600
14. 6480
15. 5704
16. -5100
17. $1,135,000
18. $24, 8, \frac{8}{3}, \frac{8}{9}, \frac{8}{27}$
19. -2, 12, -72, 432, -2592
20. $a_{40} = -1.81899 * 10^{-9}$
21. $a_n = 5\left(-\frac{1}{5}\right)^{n-1} \qquad a_8 = -.000064$
22. 177,148
23. 227.5416
24. -6564
25. 6
26. 40
27. $\frac{529}{999}$
28. $a_{30} = \$536,870,912 \qquad S_{30} = \$1,073,741,823$
29. 105
30. $x^8 + 4x^6y + 6x^4y^2 + 4x^2y^3 + y^4$
31. $32x^5 - 240x^4y + 720x^3y^2 - 1080x^2y^3 + 810xy^4 - 243y^5$
32. $-1140y^{51}$
33. $\frac{5}{4}x^2$