Trig/Precalculus
12.1-12.3 Review

Name:_____

1. Find the 20^{th} term in the arithmetic sequence 15, 21, 27, …

$a_{20} = 15 + 6(20-1) = \boxed{129}$

2. Find the sum of the first 25 terms in the arithmetic series 11 + 14 + 17 + 20 + …

$S_{25} = \frac{25}{2}(2(11) + 3(25-1)) = \boxed{1175}$

3. Find the 12^{th} term in the geometric sequence $2^{-4}, 2^{-3}, 2^{-2}, \ldots$ $r = 2$

$a_{12} = 2^{-4}(2)^{12-1}$

$= 2^{-4}2^{11} = \boxed{2^7}$

4. Find the sum of the first 10 terms in the geometric series 2 – 6 + 18 – 54 + …

$S_{10} = \frac{2-2(-3)^{10}}{1+3} = \boxed{-29524}$

5. Write a sequence that has two geometric means between 64 and –8.

64, −32, 16, −8 $\quad -8 = 64r^{4-1}$ $\quad -0.5 = r$

$(-.125 = r^3)^{1/3}$

6. Find n for the sequence for which $a_n = 19$, $a_1 = -13$, and $d = 2$.

$19 = -13 + 2(n-1)$ $\quad 16 = n-1$

$32 = 2(n-1)$ $\quad \boxed{17 = n}$

7. Find the 5^{th} term in the geometric sequence for which $a_3 = \sqrt{5}$ and $r = 3$.

$\sqrt{5} = a_1 3^{3-1}$ $\quad a_5 = \frac{\sqrt{5}}{9}(3)^{5-1}$

$\frac{\sqrt{5}}{9} = a_1$ $\quad = \frac{\sqrt{5}}{9}(81) = \boxed{9\sqrt{5}}$

8. Find the first term in the sequence for which $d = -3$ and $a_6 = 5$.

$5 = a_1 + -3(6-1)$

$5 = a_1 - 15$ $\quad \boxed{a_1 = 20}$

Find each limit, or state that the limit does not exist.

9. $\lim_{n\to\infty} \frac{3n^4}{2n^2+5}$

DNE

10. $\lim_{n\to\infty} \frac{(2n+1)(n-2)}{2n^2}$

$\lim_{n\to\infty} \frac{2n^2-3n-2}{2n^2}$

$\boxed{1}$

11. $\lim_{n\to\infty} \frac{n+1}{n^2-4}$

0

12. $\lim_{n\to\infty} \frac{n^2+1}{2n^2-3n}$

$\frac{1}{2}$

13. $\lim_{n\to\infty} \frac{2n-1}{n^3}$

0

14. $\lim_{n\to\infty} \frac{13n^4+5n^2}{9n^3-5n^2+4}$

DNE

15. $\lim_{n\to\infty} \frac{n^3-5}{n^2}$

DNE

16. $\lim_{n\to\infty} \frac{4n^3+7n^2}{5n^3-7n^2+3}$

$\frac{4}{5}$

17. $\lim_{n\to\infty} \left[1+\frac{(-1)^n}{n}\right]$

$\lim_{n\to\infty} 1 + \lim_{n\to\infty} \frac{(-1)^n}{n}$

$1+0=\boxed{1}$

Find the sum of each series or state that the sum does not exist.

18. $-\frac{3}{5}+1-\frac{5}{3}+\ldots$ $r=-5/3$

DNE bc $|r|>1$

19. $\frac{1}{12}+\frac{1}{2}+3+\ldots$ $r=6$

DNE bc $|r|>1$

20. $12+8+\frac{16}{3}+\ldots$ $r=2/3$

$\frac{12}{1-2/3}=\boxed{36}$

21. $6\sqrt{2}+6+3\sqrt{2}+3+\ldots$ $r=\frac{1}{\sqrt{2}}=\frac{\sqrt{2}}{2}$

$\frac{6\sqrt{2}}{1-\frac{\sqrt{2}}{2}}\cdot\frac{2}{2}=\frac{12\sqrt{2}}{2-\sqrt{2}}\cdot\frac{2+\sqrt{2}}{2+\sqrt{2}}=\frac{24\sqrt{2}+24}{2}$

$\boxed{12\sqrt{2}+12}$

22. After knee surgery, your trainer tells you to return to your jogging program slowly. He suggests jogging for 12 minutes each day for the first week. Each week thereafter, he suggests that you increase that time by 6 minutes/day. How many weeks will it be before you are up to jogging 60 minutes/day?

12, 18, 24, 30, ...

$60=12+6(n-1)$

$60=12+6n-6$

$60=6+6n$

$54=6n$

9 weeks

24. Francisco designs a toy with a rotary flywheel that rotates at a maximum speed of 170 revolutions per minute. Suppose the flywheel is operating at its maximum speed for one minute and then the power supple to the toy is turned off. Each subsequent minute thereafter, the flywheel rotates two-fifths as many times as in the preceding minute. How many complete revolutions will the flywheel make before coming to a stop? $r=2/5$ $a_1=170$

$\frac{170}{1-2/5}=283$ or $283+170=453$