# Review for Test

Test will cover:

*Sequences and Series

*Recursive & Explicit form

*Sigma Notation

*Applications

*Binomial Theorem

*Limits

Find the next 2 terms in the sequence. Then write a recursive **and** an explicit equation.

1. 4, 9, 14, ...

$d=5$ R $\begin{cases} a_n = a_{n-1} + 5 \\ a_1 = 4 \end{cases}$

$\left.\begin{array}{l} a_n = 4 + 5(n-1) \\ 4 + 5n - 5 \\ -1 + 5n \end{array}\right\}$ E

2. 1000, 800, 640, ...

$r = .8$

E $\{ a_n = 1000(.8)^{n-1}$

R $\begin{cases} a_n = a_{n-1}(.8) \\ a_1 = 1000 \end{cases}$

Write the explicit equation for the arithmetic sequence given $a_{11} = 80$ and $a_{30} = 251$. $\frac{171}{19} = 9 =$

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

$80 = a_1 + 9(10)$ $a_1 = -10$

$a_n = -10 + 9(n-1)$

$= -10 + 9n - 9$

$= \underline{\underline{-19 + 9n}}$

2. Geometric, $a_2 = -15$ and $a_5 = -1875$

$r = 5$

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

$-15 = a_1(5)^1$

$a_1 = -3$

$\underline{\underline{a_n = -3(5)^{n-1}}}$

Write the following in summation notation. Then find the sum.

1. -1 + 3 + 7 + 11+ ... n = 11

$\sum_{1}^{11}(4n-5)$

$S_{11} = \frac{11}{2}(-1+39)$

$= \underline{\underline{209}}$

$a_n = -1 + 4(n-1)$

$-1 + 4n - 4$

2. 2, 6, 18, ... n = 8

$r = 3$

$\sum_{1}^{8} 2(3)^{n-1}$

$a_n = 2(3)^{n-1}$

$S = \frac{2(1-3^8)}{1-3} = \underline{\underline{6560}}$

6560

Sum geo

...d the number of terms given the following.

1. $a_1 = 18$, $d = 3$, $S_n = 363$

$a_n = 18 + 3n - 3$
$= 15 + 3n$

$363 = \frac{n}{2}(18 + 15 + 3n)$

$726 = 3n^2 + 33n$

$\boxed{n = 11}$

2. $a_1 = 2$, $r = 4$, $S_n = 10922$

$10922 = \frac{2(1 - 4^n)}{1 - 4}$

$16384 = 4^n$

$\boxed{n = 7}$

Find the sum of the series.

1. $\sum_{n=1}^{8} 243(1/3)^{n-1}$

$S_n = \frac{a_1(1 - r^n)}{1 - r}$

$S_8 = \frac{243(1 - \frac{1}{3}^8)}{1 - \frac{1}{3}} \approx 364.44 = \frac{3280}{9}$

2. $\sum_{n=3}^{15} (4n - 3) = \frac{13}{2}(9 + 57) = 429$

Find the sum of the series.

1. $a_n = (-1)^{n-1} * 3a_{n-1}$ for 4 terms given $a_1 = 3$

$a_2 = (-1)^1(3)(3) = -9$

$a_3 = (-1)^2(3)(-9) = -27$

$a_4 = (-1)^4(3)(-27) = 81$

$= -48$

2. $\sum_{n=3}^{5} (2^{n-1} + 4n)$

$= 76$

$2^{3-1} + 4(3) = 16$

$2^{4-1} + 4(4) = 24$

$2^{5-1} + 4(5) = 36$

Determine if the series converges. If so, find its sum.

1. $\sum_{k=1}^{\infty} 4(3/4)^{k-1}$

Converges

$S = \frac{a_1}{1 - r} = \frac{4}{1 - 3/4} = 16$

2. $1/8 + 1/16 + 1/32 + \ldots$

$\frac{1}{2}$ Converges

$\sum_{1}^{\infty} \frac{1}{8}\left(\frac{1}{2}\right)^{n-1}$ $S = \frac{1/8}{1 - 1/2} = \frac{1}{4}$

b.) $36{,}000 + 1500(n-1)$

$180{,}000 = 36000 + 1500n - 1500$

$n = 97$



...is dropped from 25 feet off the ground. The ball bounces .7 high of the previous bounce height.

a. Write an explicit equation.

b. How tall will the ball be after 6 bounces?

c. How many bounces until the ball is less than a foot?

d. What is the total height the ball travels?

$a_0 = 25$

$a_1 = 17.5$

a) $a_n = 17.5(.7)^{n-1}$

b) $a_6 = 17.5(.7)^5 \sim 2.94$

c) $1 = 17.5(.7)^{n-1}$ Wo

$n \sim 9.02$ after 10

$S = \frac{25}{1-.7} \approx 83.3$ ft

1. Find the 3rd term in $(2b - 3)^4$

$6(2b)^2(-3)^2$

$6(4b^2)(9) = \underline{216b^2}$

2. Find the coefficient of $y^2$ in $(4 - y)^3$

$1(4)^3 + 3(4)^2(-y)^1 + 3(4)^1(-y)^2 + 1(-y)^3$

~~48~~ $\underline{12}$

3. Find the 5th term in $(1 + 4y^3)^4$

$1(4y^3)^4(1)^0$

$\underline{256y^{12}}$

Expand the following.

1. $(3x^2 - 1)^5$

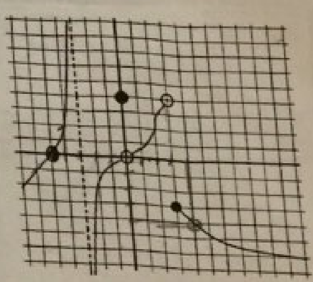
$1(3x^2)^5(-1)^0 + 5(3x^2)^4(-1)^1 + 10(3x^2)^3(-1)^2 + 10(3x^2)^2(-1)^3 + 5(3x^2)^1(-1)^4 + 1(3x^2)^0(-1)^5$

2. $(4a^4 + b)^4$

$1(4a^4)^4(b^0) + 4(4a^4)^3(b)^1 +$

1.) $243x^{10} - 405x^8 + 270x^6 - 90x^4 + 15x^2 - 1$

Find the following limits.



1) $f(0) = 4$

2) $\lim_{x \to 0} = 0$

3) $\lim_{x \to -4} = 2$

4) $\lim_{x \to 3} = \text{DNE}$

5) $\lim_{x \to -3^+} = -\infty$

6) $f(4) = -4$

7) $f(-3) = \text{DNE}$

Find the limits.

1) $\lim_{x \to -2} \frac{x^2-4}{x+2} = \frac{\cancel{(x+2)}(x-2)}{\cancel{x+2}}$

$= -4$

2) $\lim_{x \to 4} \frac{\sqrt{x}-2}{x-4} \left( \frac{\sqrt{x}+2}{\sqrt{x}+2} \right)$

$\frac{\cancel{x-4}}{\cancel{(x-4)}(\sqrt{x}+2)} = \frac{1}{4}$

3) $\lim_{x \to 3^-} f(x),\ f(x) = \begin{cases} 2x-9, & x \le 3 \\ -1, & x > 3 \end{cases}$

$3$

$2(3)-9$

$= -3$

4) $\lim_{x \to \infty} \frac{3-4x^2}{x^2+3x+2}$

$\frac{\cancel{x^2}\left(\frac{3}{x^2}-4\right)}{\cancel{x^2}\left(1+\cancel{\frac{3}{x}}+\cancel{\frac{2}{x^2}}\right)} = -\frac{4}{1} = -4$

5) $\lim_{x \to -3} \frac{x}{\frac{1}{3+x} - \frac{1}{3}} = 0$

6) $\lim_{x \to -1} \left( -\frac{x^2}{2} - 3x + \frac{1}{2} \right)$ $3$

$-\frac{1}{2}+3+\frac{1}{2}$

7) $\lim_{x \to 2} \frac{x-2}{x^3-8}$

$\frac{\cancel{x-2}}{\cancel{(x-2)}(x^2+2x+4)} = \frac{1}{12}$

$4+4+4$

⑤ $\frac{x}{\frac{3-(3+x)}{3(3+x}} = \frac{x}{\frac{-x}{3(3+x)}}$

$= \frac{\cancel{x}}{1} \cdot \frac{3(3+x)}{-\cancel{x}} = \frac{(9+3x)}{-1}$

$\frac{9+3(-3)}{-1}$

$= 0$