Sequences and Series Practice   Name _____

I. Find the next four terms of each sequence and write the equation for the nth term.

1) 1000, 500, 250, 125, ... $\underline{625}$, $\underline{312.5}$, $\underline{15.625}$, $\underline{7.8125}$ $a_n = \underline{1000\left(\frac{1}{2}\right)^{n-1}}$

$\underline{\frac{125}{2}}$ $\underline{\frac{125}{4}}$ $\underline{\frac{125}{8}}$ $\underline{\frac{125}{16}}$

2) 6, 18, 54 ... $\underline{162}$, $\underline{486}$, $\underline{1458}$, $\underline{4374}$ $a_n = \underline{6(3)^{n-1}}$

II. Given the explicit formula for the sequence, find the first five terms and the named term in the problem.

1) $a_n = 10\left(\dfrac{3}{4}\right)^{n-1}$ $\underline{10}$, $\underline{\frac{15}{2}}$, $\underline{\frac{45}{8}}$, $\underline{\frac{135}{32}}$, $\underline{\frac{405}{128}}$

$a_{23} = \underline{.0178380672}$

2) $a_n = 3^{n-1}$ $\underline{1}$, $\underline{3}$, $\underline{9}$, $\underline{27}$, $\underline{81}$

$a_{18} = \underline{129140163}$

III. Given the first term and the common ratio of a *geometric* sequence find the first five terms and the explicit formula.

1) $a_1 = 1, r = 2$ $\underline{1}$, $\underline{2}$, $\underline{4}$, $\underline{8}$, $\underline{16}$

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

IV. Given a term and the common ratio of a *geometric* sequence find the first five terms and the explicit formula.

1) $a_5 = -\dfrac{16}{27}, r = \dfrac{2}{3}$ $\underline{\frac{-3}{1}}$, $\underline{-2}$, $\underline{\frac{-4}{3}}$, $\underline{\frac{-8}{9}}$, $\underline{\frac{-16}{27}}$

$a_n = \underline{-3\left(\frac{2}{3}\right)^{n-1}}$

1

V. Find the first five terms using the given recursive formula then write the general rule.

1) $a_1 = -2$
   $a_{k+1} = 5a_k$

$\underline{-2}\ ,\underline{-10}\ ,\underline{-50}\ ,\underline{-250}\ ,\underline{-1250}$ $a_n = -2(5)^{n-1}$

VI. Evaluate each series.

1) $\displaystyle\sum_{n=1}^{8} 4(5)^{n-1} = \frac{4(1-5^8)}{1-5} = 390624$

2) $\displaystyle\sum_{n=1}^{\infty} 2(.5)^{n-1} = \frac{2}{1-.5} = 4$

VII. Rewrite each series using sigma notation.

1) $8 + 16 + 32 + 64 + 128 + 256 + 512 = \displaystyle\sum_{n=1}^{7} 8(2)^{n-1}$

2) $12 + 6 + 3 + 1.5 + .75 = \displaystyle\sum_{n=1}^{5} (12)\left(\tfrac{1}{2}\right)^{n-1}$

VIII. Evaluate each geometric series.

1) $\displaystyle\sum_{n=1}^{31} 2(1.2)^{n-1} = \frac{2(1-1.2^{31})}{1-1.2} = 2838.515766$

2) $-3 + -6 + -12 + -24\ \ldots$ Diverges because $r = 2 > 1$

3) $a_1 = -4$, $a_n = -31104$, $r = 6$

$\frac{-4(1-6^6)}{1-6} = -37324$

2