# MAC1140 SEC29 HW 11-16-2007 11.3

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**Due: 11-19-2007**

Full Name: Fei Hua Sec#: Extra Credit Attempted?

1.

[11.3.1aPT]The $7^{th}$ term of a geometric sequence with first term $a_1 = 1$ and common ratio $r = -\frac{1}{3}$ is

○ $-\frac{1}{27}$

○ $\frac{1}{81}$

● $\frac{1}{729}$

○ $-\frac{1}{243}$

$a_7 = r^{(7-1)} \cdot a = r^6 \cdot a = (-\frac{1}{3})^6 \cdot 1$

$= (\frac{1}{3})^6 = \frac{1}{3^6} = \frac{1}{729}$

2.

[11.3.1bPT]The $n^{th}$ term of a geometric sequence with first term $a_1 = 3$ and common ratio $r = -\frac{1}{3}$ is

○ $-\frac{1}{3}(3)^{n-1}$

○ $-9^{n-1}$

○ $(-1)^{n-1}$

○ $9^{n-1}$

○ None of these

● $3(-\frac{1}{3})^{n-1}$

$a_n = r^{n-1} \cdot a = 3 \cdot (-\frac{1}{3})^{n-1}$

3.

[11.3.2aPT]If a geometric sequence has $a_{11} = 3$ and $a_{12} = 5$, what is the common ratio?

○ $\frac{11}{12}$

○ $\frac{12}{11}$

● None of these

○ $\frac{3}{12}$

$a_{12} = r \cdot a_{11}$

so $r = \frac{a_{12}}{a_{11}} = \frac{5}{3}$

○ $\frac{3}{5}$

4.

[11.3.3bPT]Find the sum of the infinite geometric series $\frac{1}{9} + \frac{1}{27} + \cdots + \frac{1}{3^{n+1}} + \cdots$

○ 1

● $\frac{1}{6}$

○ $\frac{2}{3}$

○ $\frac{1}{2}$

$S_\infty = a\frac{1}{1-r} = \frac{1}{9}\cdot\frac{1}{1-r} = \frac{1}{9}\frac{1}{1-\frac{1}{3}} = \frac{1}{9}\cdot\frac{1}{\frac{2}{3}} = \frac{1}{9}\cdot\frac{3}{2} = \frac{1}{6}$

$r = \frac{a_2}{a_1} = \frac{1}{27} \div \frac{1}{9} = \frac{1}{27}\cdot\frac{9}{1} = \frac{1}{3}$

5.

[11.3.3cPT]Find the sum of the alternating infinite geometric series $\frac{1}{9} - \frac{1}{27} + \cdots + (-1)^{n+1}\frac{1}{3^{n+1}} + \cdots$

○ $\frac{1}{30}$

● $\frac{1}{12}$

○ $\frac{1}{20}$

○ $\frac{1}{6}$

$S_\infty = a\frac{1}{1-r} = \frac{1}{9}\frac{1}{1-r} = \frac{1}{9}\cdot\frac{1}{1-(-\frac{1}{3})} = \frac{1}{9}\cdot\frac{1}{\frac{4}{3}} = \frac{1}{9}\cdot\frac{3}{4} = \frac{1}{12}$

ANS

$r = \frac{a_2}{a_1} = \frac{-\frac{1}{27}}{\frac{1}{9}} = -\frac{1}{27}\cdot\frac{9}{1} = -\frac{1}{3}$

6.

[11.3.3dPT]If the repeating decimal $0.306306306\cdots$ is written as $\frac{m}{n}$ in reduced form where $m$ and $n$ are integers, then $m =$

○ 306
○ 7
○ 149
● 34

$0.306306306---$

$= 0.306 + 0.000306 + 0.000000306 + ---$

$a = 0.306 = \frac{306}{1000} \quad r = \frac{1}{1000}$

$S_\infty = a\frac{1}{1-r} = \frac{306}{1000}\cdot\frac{1}{1-\frac{1}{1000}} = \frac{306}{1000}\frac{1}{\frac{999}{1000}} = \frac{306}{999} = \frac{102}{333} = \frac{34}{111}$

7.

[11.3.3ePT]If the repeating decimal $2.303030\cdots$ is written as $\frac{m}{n}$ in reduced form where $m$ and $n$ are integers, then $m =$

○ 30
○ 12
● 76
○ 10

$2.303030---$

$= 2 + 0.30 + 0.0030 + 0.000030 + ---$

$a = 0.30 = \frac{30}{100} \quad r = \frac{1}{100}$

$S_\infty = a\frac{1}{1-r} = \frac{30}{100}\cdot\frac{1}{1-\frac{1}{100}} = \frac{30}{100}\frac{1}{\frac{99}{100}} = \frac{30}{99}$

$2 + S_\infty = 2 + \frac{30}{99} = \frac{198}{99} + \frac{30}{99} = \frac{228}{99} = \frac{76}{33}$