Pre-Calculus
10.3 Practice

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

Name Key

$S_n = \frac{a_1}{1-r}$

1) In a geometric sequence $a_4 = -36$ and $a_7 = 972$. Find S_{19}.

$\cancel{S_4} = a_1(r)^{4-1}$

$-36 = a_1(r)^3$ $972 = a_1(r)^6$

$972 = \left(\frac{-36}{r^3}\right)r^6$

$-27 = r^3$

$r = -3$ which means $a_1 = \frac{4}{3}$

$S_{19} = \frac{4}{3}\left(\frac{1-(-3)^{19}}{1-(-3)}\right)$

$= 387,420,489.3$

2) In a geometric sequence, $a_3 = -80$ and $a_8 = 2560$. Find S_{10}.

$-80 = a_1(r)^2$ $2560 = a_1(r)^7$

$2560 = \left(\frac{-80}{r^2}\right)r^7$

$-32 = r^5$

$r = -2$

$a_1 = -20$

$S_{10} = 6820$

For 3 – 5, find the sum of each infinite geometric series if possible.

3) $18 - 27 + 40.5 \ldots$

$a_1 = 18$

$r = -1.5$

not possible

4) $12 - 7.2 + 4.32\ldots$

$r = -\frac{3}{5}$

$S_n = \frac{12}{1-(-\frac{3}{5})}$

5) $\sum_{n=1}^{\infty} 6(-0.4)^{n-1}$

$a_1 = 6(-.4)^0$

$a_1 = 6$

$S_n = \frac{a_1}{1-(-.4)} = \frac{6}{1.4} = \frac{30}{7}$

6) If $S_n = 1{,}007{,}769$ for the series $3 + 18 + 108 + 648 \ldots$, find the value of n.

$1{,}007{,}769 = 3\left(\frac{1-(6)^n}{1-6}\right)$

$-1679615 = 1 - 6^n$

$1679616 = 6^n$

$\log_6 1679616 = n$

$n = 8$

7) Given the series $\sum_{n=1}^{\infty} 5(2)^{n-1}$, find the value of n if S_n=315.

$315 = 5\left(\frac{1-2^n}{1-2}\right)$

$-63 = 1 - 2^n$

$\log_2 64 = n$

$\cancel{\log_2} 2^6 = n$

$6 = n$