Mixed Exercise 3. Sequences and Series

$$
n^{t n}=a r^{n-c}
$$

1) 

a)

$$
\begin{align*}
3 r d & =a r^{2}=27  \tag{1}\\
6^{t h} & =a r^{5}=8 \tag{2}
\end{align*}
$$

(2)

$$
\div(1) \quad \begin{aligned}
\frac{a r^{5}}{a r^{2}} & =\frac{8}{27} \\
r^{3} & =\frac{8}{27} \\
r & =\sqrt[3]{\frac{8}{27}} \\
r & =\frac{2}{3}
\end{aligned}
$$

c)

$$
\begin{aligned}
& S_{\infty}=\frac{a}{1-r} \quad \text { b) Find } a \\
& a r^{2}=27 \\
& a \times \frac{4}{9}=27 \\
& a=\frac{27 \times 9}{4} \\
& a=\frac{243}{4} \\
& S_{\infty}=\frac{243}{4}=\frac{243}{4} \times \frac{3}{1}=\frac{729}{4} \\
&=182.25
\end{aligned}
$$

d) $S_{n}=\frac{a\left(1-r^{n}\right)}{1-r} \quad S_{10}=\frac{\frac{243}{4}\left(1-\left(\frac{2}{3}\right)^{10}\right)}{1-2 / 3}$

$$
S_{10}=179.0895
$$

Difference $S_{\infty}-S_{i s}$

$$
\begin{aligned}
182.25-179.0895 & =3.1605 \\
& =3.16
\end{aligned}
$$

11) a) Divisible by 3 and lie between 1 and 400

$$
3,6,9, \ldots \ldots 396,399
$$

Dst and 300
A.P, $\quad a=3, \quad d=3, \quad n=133$

$$
\begin{aligned}
S_{n} & =\frac{n}{2}(2 a+(n-1) d) \\
S_{133} & =\frac{133}{2}(6+132 \times 3) \\
& =26,733
\end{aligned}
$$

b) Find sum of numbers I to 400 not divisible by 3
$=$ Sum of 1 to 400 - answer to part A

$$
\text { AP } a=1, d=1, n=400
$$

$$
\begin{aligned}
S_{400} & =\frac{400}{2}(2+399)=80,200 \\
\text { Solution } & =80,200-26,733 \\
& =53,467
\end{aligned}
$$

3) $\quad u_{n}=95\left(\frac{4}{5}\right)^{n}$

$$
\begin{aligned}
& u_{1}=76 \\
& u_{2}=60.8
\end{aligned}
$$

$G P \quad a=76, \quad r=0.8$

$$
n^{6 t} t e r n=a r^{n-1}
$$

$$
\begin{aligned}
& u_{21}=76 \times 0.8^{20}=0.876 \\
& \sum_{n=1}^{15} u_{n}=\frac{a\left(1-r^{n}\right)}{1-r} \\
& =\frac{76\left(1-0.8^{15}\right)}{(1-0.8)}=366.62 \\
& =367 \\
& S_{\infty}=\frac{a}{1-r}=\frac{76}{1-0.8}=380
\end{aligned}
$$

17) 

$$
\begin{gathered}
a_{n+1}=\frac{1}{a_{n}} \quad a_{1}=p \\
a_{1}=p \quad a_{2}=\frac{1}{p} \quad a_{3}=\frac{1}{\frac{1}{p}}=p
\end{gathered}
$$

Periodic of order 2

$$
\sum_{n=1}^{1000} a_{n}=500 p+\frac{500}{p}
$$

