PreCalculus Math 11

p.63 #1, 2, 6, 8, 9

1. a) $t_1 = -3,\ r = 4$ divergent $(r > 1)$

b) $t_1 = 4,\ r = -\frac{1}{4}$ convergent $(-1 < r < 1)$

c) $125 + 25 + 5 + \ldots$ $r = \frac{25}{125} = \frac{1}{5}$ convergent

d) $(-2) + (-4) + (-8) \ldots$ $r = \frac{-4}{-2} = 2$ divergent

e) $\frac{243}{3125} - \frac{81}{625} + \frac{27}{25} - \frac{9}{5} + \ldots$ $r = \dfrac{\frac{243}{3125}}{\frac{-81}{625}} = \frac{\cancel{243}^{3}}{\cancel{3125}_{5}} \cdot \left(\frac{-\cancel{625}^{1}}{\cancel{81}_{1}}\right) = \frac{-3}{5}$

convergent

$S_\infty = \frac{t_1}{1-r}$

2. a) $t_1 = 8,\ r = -\frac{1}{4}$

$S_\infty = \frac{8}{1-(-\frac{1}{4})}$

$S_\infty = \frac{8}{\frac{4}{4} + \frac{1}{4}}$

$S_\infty = \frac{8}{\frac{5}{4}}$

$S_\infty = 8 \cdot \frac{4}{5}$

$S_\infty = \frac{32}{5}$

b) $t_1 = 3,\ r = \frac{4}{3}$
no sum

c) $t_1 = 5,\ r = 1$ no sum

d) $1 + 0.5 + 0.25 + \ldots$ $r = \frac{0.5}{1} = 0.5$

$S_\infty = \frac{1}{1-0.5}$

$S_\infty = \frac{1}{0.5}$

$S_\infty = 2$

e) $4 - \frac{12}{5} + \frac{36}{25} - \frac{108}{125} + \ldots$

$r = \dfrac{\frac{-12}{5}}{4} = -\frac{\cancel{12}^{3}}{5} \cdot \frac{1}{\cancel{4}_{1}} = \frac{-3}{5}$

$S_\infty = \frac{4}{1-(\frac{-3}{5})}$

$S_\infty = \frac{4}{\frac{5}{5} + \frac{3}{5}}$

$S_\infty = \frac{4}{\frac{8}{5}}$

$S_\infty = \cancel{4}^{1} \cdot \frac{5}{\cancel{8}_{2}} = \frac{5}{2}$

p.63 cont.

6. $S_\infty = 81$, $r = \frac{2}{3}$ find first 3 terms

$S_\infty = \frac{t_1}{1-r}$ $\qquad 81 = \frac{t_1}{1-\frac{2}{3}}$

$81 = \frac{t_1}{\frac{1}{3}}$

$\frac{81}{3} = \frac{t_1 \cdot 3}{3}$

$27 = t_1$ $\qquad 27 + 18 + 12$

8. $t_1 = 24\,000$, $r = 0.94$ $\left(94\% = \frac{94}{100} = 0.94\right)$

a) $S_\infty = \frac{24000}{1 - 0.94}$

$S_\infty = \frac{24000}{0.06}$

$S_\infty = 400\,000$

b) I have assumed that the rate (0.94) does not change.

9. $1 + 3x + 9x^2 + 27x^3 + \ldots$ $\quad S_\infty = 4$ $\quad$ find x and first 4 terms

$r = \frac{3x}{1} = 3x$ $\qquad S_\infty = \frac{t_1}{1-r}$

$4 = \frac{1}{1-3x}$ $\qquad$ cross-multiply

$4(1-3x) = 1$

$4 - 12x = 1$

$\frac{-12x}{-12} = \frac{-3}{-12}$

$x = \frac{1}{4}$

$1 + \frac{3}{4} + \frac{9}{16} + \frac{27}{64} + \ldots$