

pg 63 1-15

- 1a) $r=4$ divergent b) $r=-\frac{1}{4}$ convergent c) $r=\frac{1}{5}$ convergent
 d) $r=2$ divergent e) ~~$r=-\frac{3}{5}$ convergent~~ $r=-\frac{5}{3}$ divergent

2a) $\frac{8}{1-\frac{1}{4}} = \frac{8}{\frac{3}{4}} = \frac{32}{3}$ b) $r > 1$ divergent c) $r=1$ divergent
 ($5+5+5+\dots$)

d) $\frac{1}{1-.5} = \frac{1}{.5} = 2$ e) $\frac{4}{1-\frac{3}{5}} = \frac{4}{\frac{2}{5}} = \frac{20}{2} = \frac{5}{1}$

3. a) $.87 + .0087 + .000087$ $\frac{.87}{1-\frac{1}{100}} = \frac{.87}{.99} = \frac{87}{99}$

b) $.437 + .000437 + .000000437$ $\frac{.437}{1-\frac{1}{1000}} = \frac{.437}{.999} = \frac{437}{999}$

4. $.9 + .09 + .009 + \dots$ $\frac{.9}{1-.1} = \frac{.9}{.9} = 1$ Yes.

5. a) $\frac{5}{1-\frac{2}{3}} = \frac{5}{\frac{1}{3}} = 15$ b) $\frac{1}{1-\frac{1}{4}} = \frac{1}{\frac{3}{4}} = \frac{4}{3}$

c) $\frac{7}{1-\frac{1}{2}} = \frac{7}{\frac{1}{2}} = 14$

6. $81 = \frac{t_1}{1-\frac{2}{3}}$ $81 = \frac{t_1}{\frac{1}{3}}$ $27 = t_1$ $27, \overset{18}{\cancel{27}}, \overset{12}{\cancel{9}}, \dots$ $27+18+12 \dots$
 ~~$27+18+12 \dots$~~

7. $-\frac{40}{3} = \frac{-8}{(1-r)}$ $1-r = \frac{-8}{-40/3}$ $1-r = \frac{24}{40}$ $\frac{16}{40} = r$ $r = \frac{2}{5}$

$-8 - \frac{16}{5} - \frac{32}{25} - \frac{64}{125} \dots$

8. $S_{\infty} = \frac{24000}{1-.94} = \frac{24000}{.06} = 400000$ barrels

b) assuming constant rate, production continues even when production is low ...

$$9. \quad 1 + 3x + 9x^2 \dots = 4 \qquad 4 = \frac{1}{1-3x} \qquad 4 - 12x = 1 \qquad -12x = -3$$

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

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

$$10. \quad 2x = \frac{x}{1-r} \qquad 1-r = \frac{x}{2x} \qquad 1-r = \frac{1}{2} \qquad r = \frac{1}{2}$$

11. a) $r = 2x$ convergent if $|x| < 1$ or $-1 < x < 1$

b) $r = \frac{x}{3}$ convergent if $|\frac{x}{3}| < 1$ or $-1 < \frac{x}{3} < 1$
 $|x| < 3$ or $-3 < x < 3$

c) $r = 2x$ convergent if $|2x| < 1$ or $-1 < 2x < 1$
 $|x| < \frac{1}{2}$ or $-\frac{1}{2} < x < \frac{1}{2}$

$$12. \quad 3 + \frac{3}{2} + \frac{3}{4} \dots \quad S_{\infty} = \frac{3}{1-\frac{1}{2}} = 6 \text{ cm}$$

$$13. \quad S_{\infty} = \frac{50}{1-0.8} = \frac{50}{0.2} = 250 \text{ cm}$$

14. $r = 1.1 \therefore$ divergent (Andrew's answer is not reasonable)

$$15. \quad 16 + 8 + 8 + 4 + 4 + 2 + 2 + \dots$$

downs: $16 + 8 + 4 + 2 \dots$ ups: $8 + 4 + 2 + \dots$

$$S_{\infty} = \frac{16}{1-\frac{1}{2}}$$

$$= 32$$

$$S_{\infty} = \frac{8}{1-\frac{1}{2}}$$

$$= 16$$

total distance 48m