

① $-1 + 6 - 36 + 216 - \dots + 7776$
 $= 1296$
 $r = -6$
 $7776 = -1(-6)^{k-1}$
 $-7776 = +1(-6)^{k-1}$
 $\log_{-6} -7776 = k-1$
 $\log_{-6} 7776$
 $\log_{-6} 6$

$$\sum_{k=1}^6 -1(-6)^{k-1}$$

May 7-9:23 PM

Sum of Infinite Geometric Series

Find a finite sum
 What does it mean to converge?
 come together
 the terms in a series get smaller and smaller

What does it mean to diverge?
 the term larger and larger
 $3 + 6 + 12 + \dots$
 No sum!

$1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$
 $|r| \geq 1$ diverge
 $|r| < 1$ converge

$r = \text{common ratio}$

$2(3)^{n-1}$
 $2(-2)^{n-1}$ } diverge

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Ex1) $\frac{5}{6} + \frac{25}{36} + \frac{125}{216} + \dots$

$r = \frac{5}{6}$ Converge

$\frac{(\frac{25}{36})}{(\frac{5}{6})} r = \frac{5}{6}$ $\frac{(\frac{125}{216})}{(\frac{25}{36})} r = \frac{5}{6}$

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$\sum_{k=1}^{\infty} \left(\frac{4}{\pi}\right)^k$

Converge or Diverge

$\frac{4}{\pi} + \frac{16}{\pi^2} + \frac{64}{\pi^3} + \dots$

$r = \frac{4}{\pi}$

diverge

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Find the sum

$\frac{1}{2} - \frac{1}{4} + \frac{1}{8} - \frac{1}{16} + \dots$

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

$\frac{-1/4}{1/2} = -1/2 = r$

$\frac{1/2}{1 + (-1/2)}$ $\frac{1/2}{3/2}$ $\frac{1}{3}$

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Ex4:

$\sum_{k=1}^{\infty} 5\left(\frac{1}{\pi}\right)^k$

$\frac{5}{\pi} + \frac{5}{\pi^2} + \frac{5}{\pi^3} + \dots$

$\frac{a_1}{1-r} = \frac{5/\pi}{1 - 1/\pi}$

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$$\frac{\frac{5}{\pi}}{\frac{\pi-1}{\pi}} = \frac{\frac{5}{\pi}}{\frac{\pi-1}{\pi}} = \frac{5}{\pi-1} \approx 2.33$$

exact

May 11-10:02 AM

A ball is dropped from a height of 10 ft. Each time it hits the ground, it bounces to 80% of its previous height.

Find the total distance traveled by the ball.

$$10 + \underbrace{\{10(.80)\}}_{\text{up}} + \underbrace{\{10(.80)\}}_{\text{down}} + \underbrace{\{10(.80)^2\}}_{\text{up}} + \underbrace{\{10(.80)^2\}}_{\text{down}}$$

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$$10 + 2(\text{sum})$$

$$10 + 2\left(\frac{10(.80)}{1-.80}\right) = 90 \text{ ft.}$$

10 + 80 = 90

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$$10 + 2 \sum_{k=1}^{\infty} 10(.80)^k$$

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20

$$a_1 = \frac{5}{1-r} = \frac{5}{1-.96} = 125$$

$$S = 4.8 + r = \frac{4.8}{5} r = .96$$

$$\sum_{k=1}^{\infty} 5(.96)^{k-1}$$

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17

$$27x^3 + 125$$

Factor

$$(3x+5)(9x^2 - 15x + 25)$$

$a=9, b=-15, c=25$

$$X = \frac{15 \pm \sqrt{(-15)^2 - 4(9)(25)}}{2(9)}$$

$$X = \frac{15 \pm i\sqrt{-675}}{18}$$

675
 25 27
 5 5 3 9

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$$X = \frac{5 \pm 5i\sqrt{3}}{6}$$

(18)

$$6X = \frac{5 + 5i\sqrt{3}}{6} \quad X = \frac{5 - 5i\sqrt{3}}{6}$$

$$6X = 5 + 5i\sqrt{3} \quad 6X = 5 - 5i\sqrt{3}$$

$$(6X - 5 - 5i\sqrt{3})(6X - 5 + 5i\sqrt{3})$$

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$$\frac{1}{4} (3X+5)(6X-5-5i\sqrt{3})(6X-5+5i\sqrt{3})$$

$$3X \cdot 6X \cdot 6X$$

$$108X^3 \cdot \frac{1}{4} = 27X^3$$

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(16) $3(27m^3 + 1)$

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(18)

2	2	T
-4	3	C
3	1	C

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(24) $f(x) = -x^3 + x^2 + 3x - 1$

$$\lim_{x \rightarrow -\infty} f(x) = \infty$$

$$\lim_{x \rightarrow \infty} f(x) = -\infty$$

left up
right down

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