

Name: _____

Show work needed to justify your answer.

Date: _____

HW: # 19a: Math IBSL - Standard 19 - Arithmetic and Geometric Series

5 points

1 Decide whether the infinite geometric series below are converging, and if so, find the sum:

a $0.25 + 0.375 + 0.5625 + \dots$

$$r = \frac{0.375}{0.25} = 1.5$$

Not converging ($r > 1$)

b $-\frac{3}{8} + \frac{9}{32} - \frac{27}{128} + \dots$

$$r = \frac{\frac{9}{32}}{-\frac{3}{8}} = \left(\frac{9}{32}\right)\left(\frac{8}{-3}\right) = -\frac{3}{4}$$

$$r = -\frac{3}{4}$$

Converging

$$S_{\infty} = \frac{-\frac{3}{8}}{1 - (-\frac{3}{4})}$$

$$S_{\infty} = \left(\frac{-3}{8}\right)\left(\frac{4}{7}\right)$$

$$S_{\infty} = -\frac{3}{14}$$

f $\frac{1}{\sqrt{2}} + \frac{2}{\sqrt{2}} + \frac{4}{\sqrt{2}} + \dots$

$$r = \left(\frac{2}{\sqrt{2}}\right)\left(\frac{\sqrt{2}}{1}\right) = 2$$

NOT

converging

g $\frac{1}{\sqrt{2}} + \frac{1}{2\sqrt{2}} + \frac{1}{4\sqrt{2}} + \dots$

$$r = \left(\frac{1}{2\sqrt{2}}\right)\left(\frac{\sqrt{2}}{1}\right) = \frac{1}{2} \text{ Converging}$$

$$S_{\infty} = \frac{\frac{1}{\sqrt{2}}}{1 - \frac{1}{2}} = \left(\frac{1}{\sqrt{2}}\right)\left(\frac{2}{1}\right) = \frac{2}{\sqrt{2}}$$

4 A ball is dropped from a height of 12 ft. Each time it hits the ground, it rebounds to $\frac{3}{5}$ of its previous height. Find how far the ball will travel before coming to a stop.

$$u_1 = 12 \quad r = \frac{3}{5}$$

$$S_{\infty} = \frac{12}{1 - \frac{3}{5}}$$

$$S_{\infty} = \frac{12}{\frac{2}{5}}$$

$$S_{\infty} = \left(\frac{12}{1}\right)\left(\frac{5}{2}\right) = 30 \text{ feet}$$